[H.A.S.C. No. 108–29]

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Y 4.AR 5/2 A:
2003-2004/29
Department of Defense (DOD) Avi

DEPARTMENT OF DEFENSE (DOD) AVIATION SAFETY INITIATIVES

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES
ONE HUNDRED EIGHTH CONGRESS
SECOND SESSION

HEARING HELD
FEBRUARY 11, 2004

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One Hundred Eighth Congress

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DEPARTMENT OF DEFENSE (DOD) AVIATION SAFETY INITIATIVES

House of Representatives,
Committee on Armed Services,
Washington, DC, Wednesday, February 11, 2004.

The committee met, pursuant to call, at 11:04 a.m., in room 2118, Rayburn House Office Building, Hon. Duncan Hunter (chairman of the committee) presiding.

OPENING STATEMENT OF HON. JOEL HEFLEY, A REPRESENTATIVE FROM COLORADO, COMMITTEE ON ARMED SERVICES

Mr. Hefley [presiding]. If our witnesses could take their seats and we will get going. I believe Mr. Taylor has a motion. Mr. Taylor, you are recognized.

Mr. Taylor. Mr. Chairman, I move that all funds for the Base Closure and Realignment Commission be deleted from this year's budget.

Mr. Hefley. Without objection, so ordered. [Laughter.]

If we could get started, welcome. The committee will come to order. Mr. Hunter will be joining us shortly, but he is tied up right now.

Today, the full committee meets to receive testimony on military aviation safety initiatives. Today's hearing will review the past ten year history of the services class A mishaps. Class A's are the most severe accidents in which an aircraft is destroyed. Damages of $1 million or more that occur are the mishap results, and a fatality or permanent total disability. Mishap statistics are provided as the number of mishaps per 100,000 flying hours.

Historically speaking, the military's rate of aviation accidents has gone down dramatically over the years. For instance, in 1950 the Air Force and the Navy had rates of 36 and 50 mishaps per 100,000 flying hours respectively. By comparison, last year the mishap rate for the entire Department of Defense was roughly two. For the 10-year period between 1990 and 2000, overall mishaps rates declined from just over two to about 1.5. However, in 2002 and 2003, the department's overall mishap rate jumped back up about two mishaps per 100,000 flying hours.

The question is, why is this happening? It is well established Chairman Hunter is a strong proponent of modernizing our armed forces with new equipment and reducing the average age of our aircraft inventories. While I understand that human factors are the most prevalent cause-factors in the military's aviation accidents, I hope that today's witnesses will help the committee understand how aircraft aging has affected recent mishap rates.

Military aviation safety is a concern to policymakers in both the Department of Defense and Congress. We want to improve aviation safety because aviation accidents erode the department's war fighting capabilities by degrading readiness and reducing the number of aircraft readily available. Sometimes entire fleets of aircraft are grounded during an accident investigation. Accidents also consume financial resources, since damaged aircraft must be repaired and destroyed aircraft must be replaced.

Most importantly, accidents are also hard on personnel. They hurt morale and cost lives. According to the Department of Defense, 3,072 people died in military aviation accidents between 1980 and 2003. On May 19, 2003, the Secretary of Defense challenged the military services to improve accident rates. He said world-class organizations do not tolerate preventable accidents. Our accident rates have increased recently and we need to turn this situation around. This committee strongly supports the Secretary's challenge to the services.

To address this and other important military aviation issues, the committee has invited a distinguished panel to testify before us today. From the Congressional Research Service, we welcome Mr. Christopher Bolkcom, specialist in national defense and author of a recent report for Congress on military aviation safety. From the Air Force, we are glad to have Major General Kenneth Hess, Air Force Chief of Safety and Commander of the Air Force Safety Center. General Hess also chairs the Defense Safety Oversight Council's Aviation Safety Improvement Task Force. From the Navy, Rear Admiral Richard Brooks, Commander of the United States Naval Safety Center joins us. To address the Marine Corps Aviation Safety, we have Brigadier General Samuel Helland, Assistant Deputy Commandant for Aviation. Finally, from the Army we have Brigadier General Joseph A. Smith, Director of Army Safety and Commanding General of the United States Army Safety Center.

Gentlemen, we look forward to your testimony today. I now recognize the committee's ranking member, Mr. Skelton, for any remarks he might like to make.

Mr. Skelton.

[The prepared statement of Mr. Hunter can be found in the Appendix on page 49.]

STATEMENT OF HON. IKE SKELTON, A REPRESENTATIVE FROM MISSOURI, RANKING MEMBER, COMMITTEE ON ARMED SERVICES

Mr. SKELTON. Mr. Chairman, thank you very much. Gentlemen, welcome to you.

The first job that I ever had was washing airplanes at the old Lexington, Missouri airport, Piper Cubs, Aeronicas, a Culver Cadet. I see your faces glazing over when I mention those planes, but that was a day when aviation and safety were not really words you put together. The planes were then the hottest things going.

Today they are vintage. That is a nice way of saying that they are old. On Monday, I visited with the men and women who are building America's next air superiority fighter, the F/A–22 down in Marietta, Georgia. The care and precision of their work is just amazing. Like the F/A–22, we have a lot of new aircraft in our budget. For each of the services, today they are the hottest thing going, but someday they will be old.

Age is not the only reason airplanes and helicopters crash. Accident rates have a lot more to do with how we spend money on spare parts, how well we finance operations, maintenance, very significantly with the operational tempo (OPTEMPO). Looking at the testimony our witnesses prepared, I am impressed that despite high operational tempo, despite worldwide deployments, and despite budgets that sometimes sacrifice operation and maintenance or modernization, flying continues to be safe, if somewhat an unnatural activity.

I will be very interested to hear from each of you where the real strains come from in keeping flying safe. Are we working our pilots too hard? Are we training to satisfactory standards? Is there enough money for maintenance? Is there enough money for parts? New airplanes are nice to have, but we will be flying a mature fleet for the foreseeable future. We all know that. So I look forward, gentlemen, to how we are going to keep them flying.

Thank you very much, Mr. Chairman.

[The prepared statement of Mr. Skelton can be found in the Appendix on page 55.]

Mr. HEFLEY. Thank you, Mr. Skelton.

For each of our witnesses, without objection the entirety of your prepared statements will be entered into the record. Mr. Bolkcom, let us start with you, to provide an overview of the military's aviation safety processes and record. The floor is yours, and then you will be followed by General Hess, Admiral Brooks, and Generals Helland and Smith.

STATEMENT OF CHRISTOPHER BOLKCOM, SPECIALIST IN NATIONAL DEFENSE, FOREIGN AFFAIRS, DEFENSE AND TRADE DIVISION, CONGRESSIONAL RESEARCH SERVICE

Mr. BOLKCOM. Thank you, Mr. Chairman. Mr. Chairman, Mr. Skelton, distinguished members of the committee, thank you very much for inviting me to speak with you today about military aviation safety. I will address this morning three questions you will find treated at greater length in my written statement which we have just entered into the record.

The first question I would like to address is whether DOD's current level of aviation safety is acceptable. The answer is highly subjective. As you pointed out, on the one hand military aviation today appears much safer than it was 50 years ago. In 1955, DOD suffered over 2,200 class A mishaps, the most serious type of flight accidents. By 1999, this number had dropped to 70. Similarly, the number and frequency of deaths and the number and frequency of aircraft destroyed has decreased significantly over the past 50 years. From this historical perspective, the contemporary record is really a good news story.

On the other hand, the rate of aviation safety improvements has stagnated over the past 10 years, and the rate of class A mishaps has doubled recently from 1.23 class A mishaps per 100,000 flight hours in the year 2000, to 2.03 in 2003. This is bad news, and leads some to argue that DOD can and should further reduce its rate of aviation mishaps. As you noted, Secretary Rumsfeld, for example, has challenged the services to reduce all mishaps by 50 percent. A third perspective is that no mishaps are acceptable and DOD should strive toward and achieve a zero mishap rate.

The second question I would like to address is what causes mishaps. This is difficult to answer because many factors can contribute to aviation mishaps and most mishaps do involve more than one factor. That said, aircraft age, high operations tempo and human error are frequently cited as factors that affect aviation safety.

Many assume that older aircraft are more prone to mishaps. However, a cause and effect relationship between aircraft age and safety is unproven. Mishap rates have generally decreased as the average age of DOD's aircraft have increased. Some of DOD's oldest aircraft, such as the KC-135, the B-52, have good safety records. Similarly, no statistical correlation has been made between high OPTEMPO and high rates of mishaps. We have seen periods of high OPTEMPO correspond with high mishaps, but also low mishaps as well.

In contrast, there appears to be a strong body of evidence that human error is a dominant factor in military aviation safety. The General Accounting Office, each of the services and the Coast Guard have all estimated that human error is a factor in 70 percent to 90 percent of all aviation mishaps.

The final question I would like to address this morning is what can be done to further promote aviation safety. The recent 10-year plateau in safety improvements may mean that the low-hanging fruit has already been plucked, and that improving safety in the future may be more difficult than it was in the past. Therefore, initiatives that address safety on a broad level may be required.

In 1997, the Defense Science Board, which is DOD's premier body of scientific advisers, found that "leadership is the single most important factor affecting aviation safety." This suggests that it may be important to find new ways to let top leaders in DOD know that safety is a high priority and to hold these leaders accountable. Making organizational changes may also help promote aviation safety.

The Office of the Secretary of Defense (OSD) is responsible for setting aviation policies and providing oversight. Yet, OSD's current staffing levels may inhibit it from executing these responsibilities effectively. At one point, OSD had eight staff members dedicated to aviation safety. Yet, these positions have gradually been eliminated, culminating last week in fact in the retirement of the final staff member with expertise and responsibility for aviation safety.

Also, it may prove fruitful to investigate how the joint staff and the combatant commands might contribute to aviation safety. OSD directs to the joint staff and combatant commanders investigate, report, and keep records on mishaps, but these organizations generally do not have the staff or procedures dedicated to fulfilling this obligation. Many argue that safety initiatives are under funded because they do not compete well with major acquisition programs in DOD's budget process. Thus, devising techniques to give safety more traction in the budget may be beneficial.

Finally, many argue that the services are slow to field safety equipment that is commonly found in commercial aviation. Encouraging more aggressive investment in technologies such as ground proximity warning systems, flight data and cockpit video recorders, and tactile situational awareness systems may help improve aviation safety.

Mr. Chairman, this does conclude my remarks. Thank you for the opportunity to appear before you. I look forward to any questions you may have.

[The prepared statement of Mr. Bolkcom can be found in the Appendix on page 119.]

Mr. HEFLEY. Thank you very much.

General Hess.

STATEMENT OF MAJ. GEN. KENNETH W. HESS, OSD/USAF, AIR FORCE CHIEF OF SAFETY AND COMMANDER, UNITED STATES AIR FORCE SAFETY CENTER

General HESS. Mr. Chairman, Congressman Skelton, distinguished members of the committee, it is my pleasure to be here this morning on behalf of the Air Force and the Department of Defense to discuss aviation safety.

As a Nation, our aviation assets are unsurpassed. We have the capability of quickly establishing air dominance anywhere our national interest is challenged, and we must be able to accomplish this task without unnecessary risk to our pilots, our crews or our passengers. As I am sure this morning's session will bear out, the DOD and the services are committed to reducing aviation mishaps and mishap rates.

In addition to being the Air Force Chief of Safety, as I mentioned, I am here as the representative of the DOD because I chair the Aviation Safety Improvement Task Force under the Defense Safety Oversight Council. Since taking office, Secretary Rumsfeld has sought to change how the DOD views the safety of its military personnel and civilian employees. Our goal is zero preventable mishaps, and we have taken major steps in that direction.

In a May letter to the Department's leadership, the Secretary challenged all of us to reduce the number and rate of mishaps by 50 percent over 2 years. This is not a business-as-usual approach and will require real cultural change. To enable this change, the Secretary of Defense chartered the Defense Safety Oversight Council (DSOC) to address the challenges. The council has established several task forces to recommend policies, programs and investments to reduce accidents and injuries.

The Aviation Safety Improvement Task Force is a joint team from all the services. We have representatives from the Federal Aviation Administration (FAA), the National Transportation and Safety Board (NTSB), commercial aviation, as well as industry. My counterpart at the Naval Safety Center, Admiral Brooks, serves as its vice-chair. This task force will use a data-driven approach to provide factual underpinnings that support long-term risk and mishap reduction efforts.

As you know, a straightforward look at Air Force mishap rates over the past decade shows only slight improvement, but a pure numbers perspective alone does not adequately describe the operating environment that produced those numbers. During this decade, the Air Force got about 40 percent smaller, but our deployments and operations tempo have reached new highs as we have sustained combat operations in the Balkans and Northern and Southern Watch. It was also exacerbated with the beginning of the global war on terrorism, with Operations Enduring Freedom and Iraqi Freedom. The result of this tempo has been higher risk levels, not only during combat operations, but also during training and deployments as well. Taken in the fullest context, the Air Force's safety record over the past decade is exceptional, in my opinion. That said, the spike we experienced in 2002 was taken very seriously by the Air Force leadership. General Jumper and Air Force leaders down to squadron and fight level have worked diligently to drive that rate back down. Consequently, our mishap experience in fiscal year 2003 was more nearly like the decade average of about 1.38 mishaps per 100,000 hours of flying time, but that is still not good enough.

Still, the larger question remains: Can we afford today's mishap rate tomorrow? The DSOC aviation improvement task force's data-driven approach is the right strategy to identify hazards and implement controls to reduce the risk in current operations. The Air Force has completed an initial 10-year mishap analysis and the results of that effort point to the need to concentrate our efforts in the following areas: controlled flight into terrain, powerplant failures, mid-air collisions, and loss of control in flight. I am confident that many, if not all, of these areas will surface as our task force begins its work.

This committee expressed an interest in aging airplanes and its effect on mishap rates. To answer this concern directly, there are no aging issues that drive our current mishap rates. The Air Force has aggressive programs and uniform standards of air-worthiness that apply to all airplanes. This process is in place from the initial development through aircraft retirement. We have developed a structured program for assuring operational safety, suitability and effectiveness of our systems, and the end-items throughout their life cycle.

Mr. Chairman, over the past 10 years the Air Force has lost more than 300 airmen, nearly 250 aircraft, all valued at about $11 billion. These aviation accidents could have been prevented. The Air Force fully endorses Secretary Rumsfeld's 50 percent reduction goal as a beginning, and we realize that real change has to start at the grassroots level. Commanders and supervisors, the leaders, as Mr. Bolkcom has indicated in his remarks, are accountable for safety practices and standards and must take action to reduce the rates. Clearly, safety must be a priority for everyone.

General Jumper, our Chief of Staff, recognizes this priority and recently established the Air Force operational safety council, chaired by the Vice Chief of Staff. This council is composed of the senior levels of the corporate leaders and our major command vice-commanders. They will look at emerging technologies from both an operational and safety perspective, and direct required changes to Air Force policy, programs, and investments.

In closing, much work has been done, but we are aggressively working to make significant improvements in aviation safety. The

Secretary's 50 percent reduction goal is achievable and will directly increase our operational readiness. We are a world-class military and will not tolerate preventable accidents. We owe no less to the men and women who defend our Nation.

Once again, I thank you for the opportunity to be here and I am prepared to answer your questions at the end.

[The prepared statement of General Hess can be found in the Appendix on page 56.]

The CHAIRMAN [presiding]. General Hess, thank you very much. Admiral Brooks.

STATEMENT OF REAR ADM. RICHARD E. BROOKS, USN, COMMANDER, UNITED STATES NAVAL SAFETY CENTER

Admiral BROOKS. Mr. Chairman, Congressman Skelton, distinguished members of the House Armed Services Committee, I am Rear Admiral Dick Brooks, Commander of the Naval Safety Center. Together with my Marine Corps colleague, Brigadier General Sam Helland, I am here to present the current state of naval aviation safety.

As we review past naval aviation safety performance, we note significant mishap reduction rates over the past five decades. In 1954, naval aviation was averaging 54 mishaps per 100,000 hours. As of the end of fiscal year 2003, the rate was 2.42. While that was in the past, there is a common theme, for today, as in the past, our aviation safety efforts are designed to save lives, our most precious asset, preserve the valuable equipment entrusted to our men and women, and enhance our combat readiness.

As we review aviation mishap rates, I believe it is important to focus on trends, rather than on individual years. Such a trend analysis provides tangible evidence of where you are, and more importantly, where you need to go. This analysis today shows an existing viable aviation safety program, a program always facing challenges due to the high-risk nature of flight operations, but also a program that has shown many successes.

It is equally important to analyze mishap characteristics to provide focus for those areas needing correction and intervention. While today we are doing very well, we are not content with historical successes and continually strive to further reduce mishaps. To accomplish this, the first step is to review and analyze mishap causes. As we review the past 5 years, we note 83 percent of our class A flight mishaps were from human error, or had human error involved, either maintenance, air crew or supervisory. In addition, 36 percent involved some form of material failure.

Once we analyzed our mishap causes, we identified areas having the largest impact on mishap reduction. These include leadership, training and education, resources and technology. Before briefly discussing our accomplishments and programs in these areas, allow me first to provide an overview of our successful safety programs. There are many ways to compare these savings, and I have chosen 10-and 5-year comparison periods to highlight what we have saved in mishaps, lives and resources.

First, a comparison of the 10-year period from 1994 to 2003, to the period from fiscal years 1984 to 1993. During 1994 to 2003, we reduced mishaps by 106 class A flight mishaps, saved 132 lives and approximately $3 billion in valuable resources. Looking at a more recent five year comparison for the same statistics, comparing fiscal years 1999 to 2003, to fiscal years 1994 to 1998, we saved nine class A flight mishaps, 14 lives, and $541 million. These trends indicate our aviation safety program is effective and is positively impacting where it counts most, saving lives and preserving valuable equipment and resources.

In my opening remarks, I mentioned leadership, education and training as key focus areas. In the area of leadership, in January 2003, Commander Naval Air Force developed and instituted an operational risk management, or ORM, and fundamentals campaign designed to prevent and reduce aviation mishaps. In response to Secretary of Defense Rumsfeld's challenge to reduce the number of mishaps and accident rates by at least 50 percent over the next two years, we have taken additional steps.

In September 2003, we established the Navy-Marine Corps Safety Council, with an aviation safety committee, to address aviation-specific areas and look for new and innovative ways to reduce mishaps. This plan's guiding precepts include an operational risk management-based assessment of high-risk evolutions that result in questionable readiness and tactical returns, and eliminating any cultural mindset that mishaps are the cost of doing business. As General Hess pointed out, we are also fully engaged in the DSOC process and the aviation task force.

Once again in the area of education and training, all Navy and Marine Corps squadrons complete naval safety center-conducted safety surveys where a team analyzes a squadron by reviewing operational, training, maintenance, administrative procedures, and identifying the unit's strong points, as well as areas needing improvement. Today, humans play a progressively more important causal role in aviation mishaps. Consequently, the Naval Safety Center Aeromedical Division is addressing the complex human error issue.

In that regard, a human factors analysis classification system has been developed and adopted as an accident investigation and analysis tool for the Navy and Marine Corps. The goal is to address trends in human performance related to human error, possibly associated with perception, adverse mental or physiological states, or simply skill-based in nature, where the end-goal is to better understand, predict, and ultimately further reduce mishaps.

Today we are also deeply involved in some of the issues of aging aircraft. We continuously embrace emerging technologies and innovative training for aviators and maintainers, and to date, despite ages of many Navy and Marine Corps aircraft, the statistics testify to our many successes in safely maintaining and flying our legacy aircraft. Rigid inspection cycles, monthly, quarterly, annually, and required inspections based on engine hours result in mission-capable and safe operation of our aircraft despite their age.

To specifically address the issue of aging aircraft, Naval Air Systems Command stood up an aging aircraft integrated process team and is also part of the larger joint council on aging aircraft. This program's purpose is to develop effective solutions to combat the effects of aging aircraft on operational readiness.

Shifting to current and emerging technologies, some long-term initiatives include studies of successful civilian programs, and then converting them to military use, such as flight operations quality assurance. We are also continuing to research for new programs and emerging technologies, such as the tactile situation awareness system or TSAS, which is a vest with nodes that accurately make a pilot aware of aircraft movement and motion.

I also want to mention our project to Web-enable the current mishap reporting and data collection system in use at the naval safety center, known as the Web-enabled safety system or WESS. This Web-based system will truly streamline our safety business process and put timely and relevant information in the hands of those who need it most.

As for resources and naval aviation's commitment to safety, the funding line for safety-related systems has been increased. Recognizing the need to maintain war fighting capability in concert with safe operations, the Department of the Navy has invested in safety related improvements and activities to support naval aviation. To complement a timely recapitalization program that encompasses more than $11 billion a year in procurement and associated RDT&E, the Navy has provided more than $1.4 billion in fiscal year 2005 to target specific improvements in the safety and reliability of our legacy fleet.

In addition to safety investments and collision-avoidance and ground proximity warning systems, other funding priorities include such programs as the EA-6B outer wing panel and center wing section replacements; P-3 special structural inspections; and numerous communication/avionics and engine upgrades across a myriad of platforms.

Mr. Chairman, we believe naval aviation's overall safety programs and safe operating practices are a natural consequence of a winning organization that is dedicated to safe operations. Our trends indicate such, and our efforts continuously focus on prevention. Our safety culture does not accept loss of life or equipment, or maintaining the status quo as a cost of doing business. Rather, we approach aviation safety with the belief that one mishap is too many.

On issues like those I have described, our push is to find and adapt other programs that will further reduce mishaps and maintain a naval aviation culture of safety through readiness.

Thank you again for the opportunity to appear before you today. I stand by for your questions, sir.

[The prepared statement of Admiral Brooks can be found in the Appendix on page 95.]

The CHAIRMAN. Admiral, thank you.

General Helland.

STATEMENT OF BRIG. GEN. SAMUEL T. HELLAND, USMC, ASSISTANT DEPUTY COMMANDANT FOR AVIATION (AA), UNITED STATES MARINE CORPS

General HELLAND. Chairman Hunter, Congressman Skelton and distinguished members of the committee, thank you for affording me the opportunity to discuss Marine aviation safety. I understand my full statement will be entered into the record, so I will just make a few short remarks.

The Marine Corps is absolutely committed to aggressively pursuing the reduction of aviation mishaps. We recognize the critical role of Congress in this process, and we know that your attention will help to improve and focus our efforts to achieve this goal. Though we are proud of our recent accomplishments in combat operations, we know that significant challenges still confront Marine aviation safety. I have outlined some of those challenges in my statement, along with the many steps we are taking to address them and to mitigate existing risks to material and human performance.

My statement discusses historical trends to aircraft mishaps and we have also provided additional data to the committee on specific questions. Marine aviation is involved in an increasing number of initiatives to improve aviation safety, and we believe these will ultimately provide the American people with a more capable ready Marine Corps.

Mr. Chairman, we all know, however, that aviation safety is more than just statistics and programs. Less than two weeks ago, we suffered a tragic aircraft mishap at Camp Pendleton, California. Four brave Marines, Captain Adam Miller, First Lieutenant Michael Lawlor, Staff Sergeant Lori Anne Privette, and Corporal Joshua Harris gave their lives in defense of our country. I think all of us here in this room owe our complete dedication to reducing the risk of these terrible mishaps. These precious lives of our air crews and their passengers are depending on us.

Mr. Chairman, I know the members of the committee have a lot of important questions and would like to allow maximum time to answer them, so I will conclude my statement here.

Thank you.

[The prepared statement of General Helland can be found in the Appendix on page 110.]

The CHAIRMAN. Thank you, General.

General Smith.

STATEMENT OF BRIG. GEN. JOSEPH A. SMITH, USA, DIRECTOR OF ARMY SAFETY AND COMMANDING GENERAL, UNITED STATES ARMY CENTER

General SMITH. Thank you, Mr. Chairman, Congressman Skelton, distinguished members of the committee. This is certainly a unique opportunity for me, so I would like to start off by thanking each of you for what you do for our soldiers each and every day.

You have my statement for the record, but I would like to emphasize a couple of points. First, as you just heard from General Helland, safety is personal. I know it is personal to you. Most of you have been in-theater. I understand, Mr. Chairman, you just returned. It is personal to senior Army leadership, and one-fourth of Army general officers have sons and daughters serving today. It is personal to me. I have a son that is a first lieutenant Apache longbow platoon leader who is going into his second tour in Iraq in a few weeks.

Second, because it is personal, we are engaged. We are engaged at the Secretary of the Army's level. He is rolling out a strategic Army campaign plan in March. That is being briefed to the senior

Army leadership today. We are engaged in the field. Lieutenant General Sanchez has put a full-court press on safety as we have units moving in and out of theater. As the Secretary of the Army said yesterday, that is about 250,000 soldiers in about four months, and about half the aircraft we have in-theater today will be reduced.

We are engaged at the safety center. We basically do three things, like a triangle, for the Army. We assess through centralized accident investigation; we communicate to help the situational awareness; and we strongly coach risk management to try to get three sets of eyes on every activity.

I am excited to be here today and share what the Army is doing in safety. Let me start by putting the aviation class A accidents into context. Over the last 30 years, we have had a continuous downward trend through a lot of hard work. In the last three years, we have clearly had an increase in class As. From where I sit at the safety center, I look at all accidents as class A, which was described as a $1 million accident, down to a class C, which could be a $20,000 accident. We learn just as much from the small accidents as we do from the large ones. When I normalize those figures over the last ten years, we have not had an increase. We have actually had a steady state during the last three years for total accidents.

There has been a lot in the press about aircraft lost. It is important to note that of the 36 aircraft that have been destroyed in the Army, only 11 of those have been accidents. One of the things that I pay close attention to are fatalities. Over the last 10 years, aviation has caused less than 8 percent of our fatalities. In our worst year, which was last year, it was 12 percent.

What makes me not go to sleep at night is I look at all fatalities, and when I compare that to our privately owned vehicles over the last 10 years, we have lost 56 percent of our soldiers in their automobiles. So we certainly have a lot of work to do on the aviation side, but we have also done a lot right and we are trying to take those lessons-learned and put those in our ground and privately owned vehicle programs.

That completes my opening statement, because I know you have questions. I welcome those. Thank you, sir.

[The prepared statement of General Smith can be found in the Appendix on page 70.]

The CHAIRMAN. Thank you, General.

Mr. Skelton.

Mr. SKELTON. Mr. Chairman, thank you.

Let me ask each of our uniformed guests today to give me a one-word answer to this question. What is the most significant factor underlying aircraft accidents? General Hess?

General HESS. It would have to be the human factor, sir.

Mr. SKELTON. Admiral?

Admiral BROOKS. Human error, sir.

Mr. SKELTON. General?

General SMITH. Human error, sir. Yes, sir.

Mr. SKELTON. A question for our Marine Corps friend. Mr. Bolkcom has as part of his testimony a chart, table one, DOD aviation class A mishaps, 1980 to 2003. He gives the total number and then he gives a percentage mishap rate per 100,000 flight hours; Air Force, 1.46; Army, 1.8; Navy, 2.33; Marine Corps, 4.07.

General Helland, may I ask why the differential in the mishap rate for the Marine Corps compared to the other three services? Your best judgment please.

General HELLAND. Yes, sir. My best judgment would say this. The good news is it is on the decline. The bad news, it is probably higher than the other services. Marine Corps aviation is mostly tactical aircraft and tactical air systems. So most of our flight time is done in a very aggressive and you would say harsh environment. We do not have a lot of transport aircraft and those aircraft that fly straight and level for a long period of time, and develop a lot of flight hours. So all our flight hours are 1-hour flights, 1.2 hour flights, not long-duration flights.

So our accident rate is really over a smaller number of hours, so any incidents that occur, that gives kind of a numbers or a tyranny of numbers effect. That is one of the reasons why our aircraft mishap rate is probably a little bit higher. But sir, if you look at the overall trend, you will see that the Marine Corps has the least amount of accidents of all the services in that particular time.

Mr. SKELTON. Thank you, Mr. Chairman.

The CHAIRMAN. I thank the gentleman.

The gentleman from Colorado, and I want to thank Mr. Hefley for chairing this hearing and starting it off.

Mr. HEFLEY. Thank you, Mr. Chairman.

We say "human error," and yet we know that military flight is inherently dangerous, particularly fighter planes and helicopters and so forth. We are always working at it, but how realistic is it to get that human error down much more than it is now, first. Second, my impression is that those of you who fly helicopters have more accidents than those who fly fixed wings. Is a helicopter innately more dangerous to fly, more difficult to fly, more moving parts or whatever than fixed-wing aircraft?

General SMITH. If I could, I would like to start with your second question first. If you look at the fleet of 4,500 aircraft or so within the Army, they have a wide span of what they do. The TH–67, which is a training aircraft at Fort Rucker, we launch about 200 of those a day, yet they have an accident rate that is almost statistically insignificant. That is because we fly them during the day. They are light. They are flown in a training environment with an experienced instructor pilot (IP).

From the safety center when I transition that and look at the AH–64, for example, the Apache or the Kiowa Warrior, which are attack aircraft, we fly those in a very tough training environment, close to the trees, at night, under night vision devices, and in combat. So there is a clear difference in the helicopter world in terms of exposure and risk.

The second part of your question, sir, had to do with training, and can we get at the 50 percent reduction.

Mr. HEFLEY. There is always going to be human error. We all make mistakes. When you have complex machinery that you are dealing with, how far can we hope to pull down the accident rate due to human error? I know we can pull down the mechanical things, and so forth, but how much further can we expect to go with the human error?

General SMITH. I think we are going to aggressively attack that with air crew coordination in the Army. We just had a new program established a few weeks ago and we should have that in the field within another couple of months. We see most of our accidents are associated with air crew coordination, what goes on in the cockpit, and we really do believe that by putting this new program in the field, it is continuation training. We are probably looking at 6 to 9 hours for each aviator. So we believe that will get after it.

The second half for us, because we think leadership is important, we have a new commanders's safety course, so we are trying to coach at the commander level, as well as what is going on in the cockpit. In answer to your question, I think we can reduce it.

General HESS. I would like to add to what General Smith has said. Certainly, our exposure in Afghanistan caused us to have helicopter mishap rates that were higher than normal. But I think the risk exposure in the operating environment was largely responsible for that, even though combat losses themselves, in other words aircraft that we lost due to direct enemy action, as it is referred to in the DOD instruction, we did not lose many for that, but on the way to and from supporting troops in the field, we would lose helicopters in the mountains where we were working on the very, very edge of our capability.

Second with regard to human error, I still think that there is a lot we can do. There is a lot we are learning every day when it gets to interfacing the human and the cockpit and the mission together. Task mis-prioritization or task saturation, as you and I would call it, is a big deal in some of these mishaps when we take a look at trying to figure out what may have been going wrong in the cockpit. As the situation becomes critical and the aviator is starting to load-shed, if you will, certain things I am not doing so I can concentrate on other things, can get themselves behind the power curve and get in trouble.

So anything that we do in terms of bringing up the situational awareness in the machine itself will help prevent that kind of task mis-prioritization or task saturation that goes on. That technology is improving in leaps and bounds as we bring information into the cockpit.

On the ground, there are things we can do to take care of these very complex missions. Our simulation technology has moved from very mechanical, in-the-box kinds of simulators, to distributed training. Now it is moving to distributive mission operations where you are bringing many different elements together in the live, virtual and the simulated characteristics so that you are able to experience a lot of concentrated work before you ever get in the cockpit. I think that will improve the task saturation.

We talked a little bit earlier about the tactile vest that people are talking about, things that will help prevent special disorientation of an airman that is getting very, very busy and then forgets to pay attention to the altitude of his airplane and all of a sudden finds himself behind the power curve. This will improve as that technology comes into the force. So there are a lot of things we can do.

It is clearly going to be one of the hardest things that we have to solve if we want to drive down mishap rates appreciably.

Admiral BROOKS. Yes, sir, if I could add to that comment. I took over command of the Naval Safety Center in September. We started talking about human error. My question was, define human error for me. What is human error? Sir, as you pointed out, we all learn through making mistakes, what I call the honest mistake. That, to me, is very difficult to get at, but I mentioned we are doing some human factors work to try to pursue that.

There is another part of human error that we do not see quite as much of, but it is still out there. That is when people go out and do things they should not be doing. Sometimes those things cost us lives. They cost us resources. So the low-hanging fruit in this are, to me, right now is probably the standardization in the practices that have to be adhered to. We are doing that, ensuring that people know what the rules and regulations are, to minimize that.

The tougher part is the human error that people learn through mistakes. I agree with General Hess. It is through training, using simulation, having low-time flyers, say, those with less than 500 hours do things in the simulator that you really do not want them doing in the aircraft so they can learn in a free environment, if you will, and then take those best practices out into the aircraft.

So there is a lot we can do on the ground, but I always look at the human error part as those things that we can actually go after and make sure people adhere to the right standards. And then the "how do we learn" part of it, which is much more difficult to get after, but we all realize that is the piece we really have to focus on in many areas because as I said in my opening statement, 83 percent of what we see on the naval side is in fact human error.

Mr. HEFLEY. Thank you.

The CHAIRMAN. I thank the gentleman.

Mr. Taylor.

Mr. TAYLOR. Thank you, Mr. Chairman, and I want to thank all you gentlemen for being here.

Mr. Bolkcom, I found your comments particularly interesting when you talked that older systems are not necessarily less safe and newer ones are not necessarily more safe. The Marines have made a decision to hang onto the UH–1s until the V–22 is ready to become part of the fleet.

My question is, do we hit a time should the V–22 for whatever reason, be it technical reasons, budgetary reasons, developmental reasons, should it continue to be delayed, do we come to a time where the UH–1s reach group obsolescence and the Marines are either flying very vulnerable aircraft or not able to fly them at all?

Mr. BOLKCOM. Pertaining to safety, sir, I believe that as long as they fly them, they will do their best to make them safe. I think that what is going to happen, if you saw such a scenario where the V–22 was canceled or prolonged even. Further is that you would spend more money to keep these UH–1s safe. So there are certain air-worthiness standards that they would adhere to, but it would become increasingly expensive. So I would not necessarily anticipate an increase in mishaps, but certainly could anticipate more energy, more time, more resources being put into that type of aircraft.

Mr. TAYLOR. I would also like to open this up to the entire panel for both questions. The question, and again I do not by any means try to pass myself off as an aviation expert, but some of the experts who testified before this committee just last year were saying that we were reaching that group obsolescence on the KC–135s. I would like to hear your opinion on that statement, and where do we stand on that apparently with the delay now of the big lease going to the Boeing Company.

Mr. BOLKCOM. Sir, from the safety perspective?

Mr. TAYLOR. Yes, that is what we are looking at, from the safety perspective.

Mr. BOLKCOM. Yes, sir. From a safety perspective, it is a multi-engined airplane. As one of my co-witnesses here mentioned earlier, it does fly a fairly benign flight profile and historically has had a very good safety record. Again, I think that if we do have problems with the aircraft, they will be terms of spending more money to operate and maintain it. I would not expect that effort to translate into higher mishap rates.

Mr. TAYLOR. Okay. Yes, sir?

General HESS. I will kind of pile in on top of that. From an Air Force perspective, the KC–135 does have a very, very low mishap rate when you take a look at just pure safety numbers. It is around .35 or something like that per 100,000 hours of flying time. It is minuscule by comparison to some others that we could pick.

It is largely due to the fact that it is multi-engined. There are multi-systems on it, a lot of redundancy. So from a safety standpoint, it does not put the airplane or the crew at tremendous risk at any time. When you try to say, is it safe and should it be continued? Or is it reaching the end of its service life? Those are two separate questions.

Mr. TAYLOR. Why don't you answer both those questions?

General HESS. All right, sir. We are going to maintain the flight safety standards of that airplane at whatever cost is required to keep it safe as long as it is in the inventory. If that means we have to take it out to the depot and take the wings off it and get corrosion off of it, we are going to do that because the flight safety standards will not be compromised.

On the other hand, when you take a look at the cost-benefit of whether or not you want to take them to the depot and take them apart one more time, and look at corrosion and stuff like that, in terms of how much more useful life is left in the machine versus the dollars you are going to spend on it, you could come up with a different answer. One is in the logistics realm, but in the safety realm and flight safety standards, it is going to stay safe as long as it is in the inventory.

Mr. TAYLOR. Okay. General Helland, I am curious if the Marines have given any thought to maybe going to some Blackhawks as a bridge between the UH–1s and the V–22? Or do you feel like that program is still on track and you are comfortable from a safety point of view with the progress in that transition from the UH–1s to the V–22?

General HELLAND. Sir, the situation with the V–22 is that is has accumulated over 1,050 flight hours in the developmental testing. We received the aircraft on time. They are in good shape. The contractor that is providing them has delivered them with a very minimal amount of aircraft discrepancies. They are flying and they are doing very well.

We just finished testing in Newfoundland where we did ice testing on the aircraft. It turned out very well and it is ongoing. We have an open process with our testing where we exchange data between the developmental testers and the operational testers. Our confidence is growing in the V–22 and will continue if we stay on track and do our event-driven testing as we have planned now.

Mr. TAYLOR. What is the time line off the top of your head for the full transition out of the UH–1 into the V–11. Are we talking about another decade?

General HELLAND. One moment, sir. We are doing two transitions at the same time, sir. The H–1 will transition to the H–1 Yankee, and that will be in the November 2007-2008 time frame. The V–22 will be coming in somewhere around the 2009 time frame, with IOC. IOC meaning initial operation capability, to be able to put a full squadron forward-deployed. Right now, that is still on track, sir.

Mr. TAYLOR. Okay. Thank you, Mr. Chairman.

Thank you, General.

The CHAIRMAN. I thank the gentleman.

Mr. Gibbons.

Mr. GIBBONS. Thank you, Mr. Chairman, and gentlemen thank you from a grateful Nation for what you do for defending our country. We are very proud of the work you do.

I had a question with regard to safety statistics, particularly with the Air Force and the Army. In my experience, and I have been in both, active duty and National Guard rates, have you ferreted out, sorted out differences of accident rates, occurrences of accidents whether they were national guard or active duty? General Smith?

General SMITH. I am sorry, sir. I could not hear you please.

Mr. GIBBONS. Have you sorted out in your accident study and review of causation, differences between active duty and Guard accidents?

General SMITH. Yes, sir. We have looked at that quite a bit, and obviously because of the experience-base in our reserve component, generally when they are not deployed, they have a better safety record in general.

Mr. GIBBONS. Why would that be? You say just per experience.

General SMITH. Again, this comes from probably a 10-year snapshot of showing more experience in terms of total flight hours within the reserve component. But as we are seeing now as we are getting closer to deploying, we do not see anything that is statistically significant in terms of active or reserve with accidents.

Mr. GIBBONS. General Hess, your experience in the Air Force Air National Guard?

General HESS. I would second what General Smith just said. We did a 10-year analysis, as I mentioned in our statement, and if you look back across all 10 years, the reserve and guard tend to have a better mishap rate statistic than the Air Force at large does. I think that goes right back to having a team that is put together for a long period of time, maintenance troops who work those airplanes and know them kind of like their car, so that familiarity helps a lot.

Mr. GIBBONS. Is there a usual difference between the age of the aircraft that the Guard is flying versus the age of the aircraft the active duty is flying?

General SMITH. In the Army, sir, as you know, we have been doing a lot of transitioning.

Mr. GIBBONS. You do cascade older equipment down to the Guard, don't you?

General SMITH. Yes, sir.

Mr. GIBBONS. So they are more difficult to maintain.

General SMITH. Sometimes that is true as we cascade, but again because of what General Hess was saying, the fixed facilities and the amount of time put on each individual aircraft, they do a great job maintaining those airplanes.

Mr. GIBBONS. Let me ask General Hess. General Hess, do you anticipate extensive grounding of the F–15 as it ages into the future? In other words, as it becomes an older weapon system with more and more expense required to fly per house, with greater and greater maintenance costs, do you see larger numbers of groundings of the F–15, much like what Mr. Taylor asked about the KC–135?

General HESS. Sir, I really do not have the information to answer that question for you effectively. If I could, I will take it for the record and get you an answer on what the current maintenance hour, manning per flying hour is, and the costs, so that we can get you the right answer.

Mr. GIBBONS. My question was just simply, obviously we do not put an aircraft into the air that is not air-worthy. As an aircraft or a weapons system ages, the air-worthiness is constantly being worked on. It is not a new system. So I see down the road, and I just wanted to get your opinion, whether or not that system was going to experience more grounding because of its age and the requirements for additional cost and maintenance.

Briefly, let me follow this up with a question. What suggestions have your safety boards made to reduce class A mishaps?

General HESS. Almost entirely, the recommendations will drive into the three areas. One is controlled flight into terrain, where you are trying to come up with reasons to prevent unexplained accidents, where you hit the ground. That is almost entirely in the technology area, things like ground collision avoidance systems and things of that nature. Engine technology has been a big driver of our mishap rate over the last decade.

In the F–16, for example, 40 percent of F–16 class A mishaps are related to the single engine that is in it. The Air Force has invested quite a bit of money, certainly since the late 1990s to this particular time here, in upgrading that engine to increase its reliability and therefore increase its overall mishap statistics. So it would be things along those particular lines.

Mr. GIBBONS. I thank the gentleman and thank you, Mr. Chairman.

The CHAIRMAN. I thank the gentleman.

The gentleman from Texas has kindly allowed Mr. McKeon to go next. I know he has a pressing engagement here. Mr. McKeon was a driving force to have these hearings, so I want to thank you for pushing the hearings, Buck, and you are recognized for your questions.

Mr. McKEON. Thank you, Mr. Chairman, and thank you to the gentleman from Texas for giving me his time.

Gentlemen, thank you all for being here and thank you for what you are doing to improve our safety record to protect the lives of our service people. I appreciate what you are doing.

General Helland, I have some specific questions for you. You talked about in your opening comments the mishap rate in Desert Shield-Desert Storm was 8.42 and then in Iraqi Freedom, it is down to 5.96, and that is a good improvement.

General HELLAND. Yes, sir.

Mr. McKEON. Do you have that broken out between the different aircraft?

General HELLAND. No, sir, I do not, but I can provide that if you wish.

Mr. McKEON. I would appreciate that.

General HELLAND. Yes, sir, I will.

Mr. McKEON. Specifically, I would like to see what the different aircraft mishap rates are.

General HELLAND. Yes, sir.

[The information referred to can be found in the Appendix beginning on page 178.]

Mr. McKEON. Regarding the AV–8B Harrier mishaps in calendar year 2003, could you talk specifically what were the causes of those accidents and what corrective measures have been taken or are being taken to fix those aircraft and alleviate those problems? And also the status of the investigations of the December 2003 mishaps.

General HELLAND. As of right now, sir, all of those accident investigations are in process. All the accident mishap boards have been formed and they are actively looking into what caused those accidents. If I were to speculate on the exact cause at this point, I think it would not be the right thing to do. So if I can, as they become available and the legal process has been completed, if I can provide them at that time, I will.

Mr. McKEON. I would appreciate that. I do not want you to speculate.

General HELLAND. I know that there have been five. One has to do with a training flight; one has to do with some sort of an anomaly in the aircraft on short final; one has to do with perhaps engine foreign object damage. We are looking into those right now. Again, to speculate would be improper on my part.

Mr. McKEON. Right, right.

What are the required flight hours for an AV–8B pilot?

General HELLAND. The United States Marine Corps campaign plan has as our goal between 12 and 15 sorties a month. The AV–8B flies approximately 1 to 1.2 hours per sortie. Right now today, based on the last statistics I have, they are flying approximately 12.5 hours per month. So they are right in the target goal for the campaign plan. Their T&R syllabus has the same factor, about 15.2 hours in the T&R plan, the T&R being training and requirements. Not every pilot, as you know sir, is the same. Some pilots require more training; some pilots require less, especially as they get more senior. So it is basically an update in their training and readiness environment.

Based on those numbers I just gave you, we are within the target for the Marine Corps campaign plan. To give you an idea of how it balances out across the fleet of all the aircraft we have in the Marine Corps, our average right now is 13.7 per pilot per aircraft across the spectrum. Why is it kind of low right now? Well, we have a lot of aircraft on deployment. We are moving 128 aircraft back into Iraq, so there is a little bit of a lull in our ability to fly every day all day. But if you go back to the Harrier, and they are getting 13.5 hours per month, that means they are flying basically every other day. Since it is a 1.0, they are getting a takeoff and a landing every other day. I think that is pretty good for a 30-day span.

Mr. McKEON. When they are deployed in the area, how often do they fly?

General HELLAND. I will use my own personal experience, sir. When I was a marine expeditionary unit commander, I had Harriers aboard the amphibious ship, and they averaged at the end of our tour of 1 year 20 hours a month. When they were aboard ship, it was a little bit lower. It was about 13.

Mr. McKEON. So about the same in training as they are in combat situations?

General HELLAND. Yes. Sir, another point of reference, the AV-8s that were deployed to Afghanistan flew 28.8 hours a month, and 50 percent of that time was at night. We are talking about off a runway in Bagram, 90 feet wide, dust, dirt, tracers, mortar rounds, that sort of environment. They are getting their fair share, sir.

Mr. McKEON. What was the mishap rate there?

General HELLAND. We had the one, if you recall, that they had the nose gear. He landed at night, very strong cross-wind, and his nose gear ran off the tarmac and collapsed.

Mr. McKEON. I have some other questions. If you would agree, I could submit them to you in writing.

General HELLAND. Absolutely, sir. I am more than happy to answer.

Mr. McKEON. I really appreciate that. Thank you very much.

General HELLAND. Thank you, sir.

Mr. McKEON. Thank you, Mr. Chairman.

The CHAIRMAN. I thank the gentleman.

General Helland, when will you have a definitive report on these last five incidents?

General HELLAND. Sir, I cannot answer that because it is out of my control. It has to go through the whole process, the Navy safety center process, and through the legal process. Again, if I were to tell you a date, I would be wrong.

The CHAIRMAN. Are we looking at a number of months, end of the year?

General HELLAND. I would say a number of months. Sir, we want to get it right, and especially with safety. Safety is absolutely important and we want to understand exactly what happened with the aircraft, if it is a human factor or a material problem. We want to make sure we get it right so we are not guessing in the long run.

The CHAIRMAN. Okay.

The gentleman from Texas.

Mr. REYES. Thank you, Mr. Chairman, and thank you, gentlemen, for being here and testifying on the very important issue for all of us.

My first question goes to Mr. Bolkcom. Is it possible to get statistics? And the reason I ask this question is because at times we have a difficulty because we are comparing apples to oranges. Is it possible to get statistics that would give us information on all of the service training and safety programs and their effectiveness, and how they may play into the number of accidents, so that we can get a comparison of what is working and particularly what works in one service and might not work in another one.

Mr. BOLKCOM. My answer is condition on what you mean by "how effective they are," sir. What exactly did you have in mind there? What training? How effective they are in trying to draw a cause and effect relationship between certain training and a reduction in mishaps? Is that what you are getting at?

Mr. REYES. Right, those aspects, yes.

Mr. BOLKCOM. I will tell you, sir, I am sure we could. The services keep very thorough and methodical records on mishaps and training. I am convinced we could come up with a very large dataset. I think the challenge, of course would then be to try to derive some inferences based on the sort of training and reduction in mishaps. It would be more of an analysis than an empirical sort of proof. But I think that certainly could be done.

Mr. REYES. I think that would be very valuable in order for us to get an opportunity to compare how the different services are doing, again using similar training programs, safety programs, types of aircraft and things like that.

Mr. BOLKCOM. If I may, could I follow up with your staff after the hearing?

Mr. REYES. Sure, absolutely.

Mr. BOLKCOM. I will make sure we focus it appropriately.

Mr. REYES. Absolutely.

If you could, and this may not be possible, but I would be interested in seeing what the wartime impact has on those safety statistics as well.

Mr. BOLKCOM. Can do.

Mr. REYES. Thank you.

For the rest of you gentlemen, can you give us a sense of the role that fatigue and metal stress and age of aircraft in how that affects the training, the safety? Or does it contribute to the statistics on these accident compilations?

General HESS. Congressman, are you talking about the fatigue in the sense of the pilot?

Mr. REYES. No, no, in the aircraft, because as a number of my colleagues have mentioned, metal fatigue.

General HESS. Metal fatigue.

Mr. REYES. Let me just tell you, from my personal experience when I arrived in Vietnam in March of 1967 and the Marines were still using CH–34s, the big radial engine helicopter, when the rest of us were using Hueys, UH–1s. Clearly, they were these big lumbering helicopters that were being knocked out of the sky a heck of a lot easier than were the UH–1s. That is why I asked that question.

General HESS. Congressman, I have been at the Air Force Safety Center for 18 months and we have had only one structural failure, and that was on an F–15 that was on a test hop out of Eglin Air Force Base in Florida. It was caused by corrosion, water intrusion in the composite there. The reason we have very, very, very few of those kinds of mishaps are because we have aircraft structural integrity boards and things that evaluate our structures very carefully to look for problems like corrosion and fatigue, to make sure that they do not show up in our mishap rates.

So I would not say that we in the Air Force have any indication that fatigue in the sense that we are talking about here is causing the safety mishap rate to rise. In some cases where we go out and do some analysis and take a look at a particular airplane, you may narrow down its operating environment until a modification is complete to take care of a problem that you uncover.

In the case of the F–15, like I described, they put limitations on the top Mach and the amount of G-force that you could pull in those airplanes until they were modified. It was a minor change and did not affect overall operational capability, but we would not let it go to the full extent of the operating envelope that is prescribed in our technical manuals.

Admiral BROOKS. Sir, on the Navy side, I would echo General Hess's comments. I was sitting here as he was answering the question, trying to think back if we had had a recent or even in the past few years anything happening having to do with fatigue life, structural failure on the aircraft. I cannot recall that happening. I can take that and get back to you if we have one, but it does not come out to me as anything that stands out among the other reasons that we have mentioned here today.

General SMITH. From the Army perspective, we have a very good program, of course, for inspecting and paying close attention to the stresses. It is interesting that once we find that, it takes a while to get an aircraft back into the inventory. So in a macro sense, it does impact on training because that aircraft is not available to fly, but it really does not impact on our safety program per se.

Mr. REYES. Thank you, Mr. Chairman.

The CHAIRMAN. If the gentleman would yield for a minute. General Hess, you are saying that you have only had one case of fatigue of structural failure, in this case corrosion, in the 18 months you have been working this program?

General HESS. Yes, sir.

The CHAIRMAN. Is it the testimony of all of you that you have had no cases of structural failure or fatigue in the last 2 years or so?

Admiral BROOKS. In the Navy's case, sir, I have been there since September, but one does not pop out at me. I could take that and provide that for the record, but it does not stand out in all the reasons we have seen and talked about so far today.

The CHAIRMAN. General Smith?

General SMITH. Sir, I will take that question for the record, but I do know that at depot level we find a lot of metal stress within our helicopters, but I cannot quantify that for you. I will certainly take it for the record.

The CHAIRMAN. So you may have had some crashes as a result of metal fatigue. You are not sure?

General SMITH. None that I am aware of.

The CHAIRMAN. I see that your support staff is shaking their heads. That is okay. It is okay to use support staff. Go ahead. Why don't you get the answer from your backup, from your staff, and we will ask General Helland.

General HELLAND. Sir, I have to agree with Admiral Brooks. I do not recall one in recent history, but I think it is wise that we go back and take a look for you and give you the right answer; go back to Naval Air Systems Command and ask them what they have on record. They will know because like General Hess said, all aircraft are built to a certain standard. They are maintained at a certain standard. That is why we have the depot level maintenance and we have reoccurring inspections to make sure that should something develop or should we see a trend develop in a structure, that we stop flying. The perfect example was the EA-6B. It had some outer-wing panel problems. As soon as it was discovered, bingo, the aircraft was taken care of and pulled off, and things are being done now to fix it.

The CHAIRMAN. Okay. I thank the gentleman from Texas.

Mr. Kline.

Mr. KLINE. Thank you, Mr. Chairman. Thank you very much, gentlemen, for being here.

I think most of you know that this was central to my life, my previous life, so I have been fascinated by the testimony and by the questions and answers. Let me say that I am so happy that we are operating so much more safely today, when my son is an Army Blackhawk helicopter pilot, than we were in all services 30 years ago. I remember a time when I was in a squadron and we had four strike aircraft accidents in the period of time I served in that squadron. It was a CH–53 for those of you who were going through your rolodex.

Now, it is very common to have a similarly equipped squadron go for years without such an accident. It is a remarkable improvement and I think in large part to understanding the human error and NATOPS or standardized procedures. I am delighted to hear that we are talking about air crew coordination. I am somewhat shocked to hear that the Army is talking about having a commander safety course, when the naval services have had such a thing for over 20 years in my own experience.

So I guess my first appeal to you would be, please share those experiences with each other because it is a shame that we are hearing that the Army is looking at having this course, when it has been out there for a long time.

Let me get to my question. I was struck to hear General Smith talk about the terrific safety record at Fort Rucker in training with helicopters, which are arguably more complex than the T–34, which the naval services use. I am looking at the statistics here in front of me that show an 11.42 accident rate for the T–34 in the naval training command, which is the highest of the numbers that I am looking at.

Is the Army doing something right that the Navy and Marine Corps are doing wrong in the training command? How are you accounting for this amazing discrepancy in operating and training environment between the T–34 and the Army helicopters? I will throw it to you, Admiral Brooks, and then General Helland if you have a comment.

Admiral BROOKS. Sir, I would say, what period are you looking at?

Mr. KLINE. I just have a summary sheet here in front of me that shows the Navy's overall class A mishap rate for the past 10 years is 1.62, and then it shows aircraft with 10-year histories that are notably above the mishap rate. It includes the F–14, the H–53, near and dear to my heart, the H–46, a 3.24, and the T–34 at 11.42. I think that is a summary probably provided by the committee staff, and if those numbers are wrong, I apologize.

Admiral BROOKS. Sir, I would like to take that for the record and make sure we have the right information. What I am showing is significantly less than that. I am not saying right or wrong here, but I think we might have some different information. I will say, though, that I think you bring up an excellent point, to look at each service and find out what we are doing right and what we are doing that maybe is not so right.

One of the areas we worked together on is we have a joint service safety council meeting twice a year where we all get together and discuss not only aviation safety, but all the safety areas to find out what kind of best practices one service may be using that another one is not using, so we can learn from each other. If I can, sir, I will take that for the record and get back to you to make sure we have the right data here.

Mr. KLINE. Thank you, admiral, I appreciate that. General Helland, you are probably looking at the same number as the admiral is, so you have something different than I do here. This is just striking that there is an accident rate that high in the T–34, which frankly is not that difficult an air frame and it is a training environment similar, I would think, to the one the Army has, where they have a terrific safety record in their training command. So if our numbers are wrong, I would appreciate getting the correct information from you. I do hope on my larger question is that you are looking at how we are training in the Army versus the Navy and Marine Corps.

General Helland, did you have a comment?

General HELLAND. No, sir. I agree with Admiral Brooks. We will have to look into this for you and find out if we are suffering from the tyranny of numbers again, and we have not looked at the right data. We owe you that.

Mr. KLINE. Thank you very much.

Mr. Chairman, I yield back.

The CHAIRMAN. I thank the gentleman.

Dr. Snyder.

Dr. SNYDER. Thank you, Mr. Chairman.

I think I just have one question, but I was going to make a couple of comments, if I might. General Hess, your written statement really brought home what we are talking about here, when you have this statement in there that over the last 10 years, while we have a good safety record, that we have lost 300 pilots, 250 planes, totaling $11 billion. I know there are probably 110 people sitting here, and you put all of those people in a room and just think of not only tremendous human beings, but tremendous training and skill and professionalism that you lose. So I think it is important what you are doing and I appreciate the Chairman holding the hearing.

A few weeks ago, I went to the Little Rock Air Force Base and they wanted to show me the new J-model simulator. We were pretty rushed out there so they said we are not going to do all the motion with it, but we want to just have you sit in the seat and we will show you the new graphics and all. After about 3 minutes, I had to have them stop it because I was getting motion sick and they did not have the motion thing turned on. I am too wimpy for military training or something. I think it would have been better if we had had the motion, because somehow you were moving.

My point is, that stuff is so real, as you know. It is the kind of thing that technology brings you in terms of training and all. Mr. Chairman, it gives me a chance to bring up this issue that you and I talked about the other day when I asked Secretary Rumsfeld and Dr. Zakheim about the President's budget with regard to basic research.

I am concerned because the president's budget has a cut in basic research dollars. Dr. Zacheim's response was that, no, it is an increase over the President's budget from a year ago, which is true. The problem is that the Congress had plussed-up the number, so the President has proposed a cut in the number.

Basic research is not going to pack on anyone's career in this room. Basic research is that most basic stuff, but you are talking about what magnificent things we will be doing 15 and 20 and 25 years from now in terms of training and the kinds of equipment. You were flying Caribous in Vietnam, General Hess. It is a whole different ballgame flying planes now.

My point is, if we under-fund basic research, which has always been a tremendous source of funds for research in the country, we are holding back the efforts that you all are and your successors will be trying to do in the future in terms of providing safety.

Another comment I want to make, someone said that flying some of these planes, like fighters, is inherently dangerous. I would think that you all would not accept that. I would say it is inherently challenging. As the Kosovo air campaign showed, there is ability with the discipline and training and air frames and mechanics and the commitment, to do very, very difficult things in a safe manner, in that whole campaign, not losing pilots over Kosovo. So I think as long as we think it is inherently dangerous, it will hold us back from moving ahead with safety.

Another comment I want to make, we had a young woman in the Air Force a week ago or two weeks ago, who died in a single-car crash just fairly close to the Little Rock Air Force Base. The challenges of how do you keep people from being hurt, I suspect General Hess, is that in your ballpark too, auto safety? I do not know what the numbers are, but the loss that we have from these young people in crashes. I know that is something I would appreciate any comments you might have on what you are doing in that effort.

My one specific question is, would you amplify on, General Brooks, I think, you said that 36 percent of the accidents are materiel related. What does that mean? Amplify on what "materiel" means. Those are my only comments.

Admiral BROOKS. Yes, sir. "Material related" would be when they go through the accident investigation process, they identify a component in the aircraft, say it was a hydraulic component, a flight control surface, something like that that directly contributed to the mishap itself.

General HESS. Actually, if I could talk about your POV question, your vehicle question for just a second. We can probably speak for a long time on this. I will try to be as brief as I can.

First of all, all of us here at this table probably work the motor vehicle problem as hard or harder because each of the services is affected more by the slaughter on our Nation's highways than we are by problems that we confront that are significant on the aviation side as well.

Secretary Rumsfeld's DSOC has an Automobile Safety and Prevention Task Force. It is working some very, very knotty issues in terms of how can we do better. In the Air Force, for example, the chief of staff last year gave me almost $700,000 to go back and redo three of our most significant ground safety training programs, starting at basic training and moving forward. We have programs in place to identify at-risk drivers.

On the motorcycle side, we are trying to come up with a campaign plan that would come up with a mentoring kind of squadron at the local level to make sure that these young riders have somebody to emulate other than what they see on the TV and places like that, where they sometimes find themselves thinking they are more bullet-proof than they really are, because we find that in the majority of cases in the four-wheel vehicle kind, we are losing are young airmen out there on the highway at night, usually by themselves, sometimes without a seatbelt on, sometimes after having been drinking.

On the motorcycle side, we are finding that a large portion of the accidents we have are a direct result of lack of proficiency on the machine that they are on, and they are trying to go too fast, and they exceed their experience level. This is a national problem. This is very much like right outside the gate of anybody's hometown, the same statistics will prevail.

The CHAIRMAN. I thank the gentleman.

Mr. Hayes.

Mr. HAYES. Thank you, Mr. Chairman.

General Smith, first for you. As the representative of Fort Bragg and Pope Air Force Base, contract aviation is very important to flexibility for a whole host of different reasons. We have been going through, and you may be familiar with this, discussions about the inherent difference, if any, between the safety of part 135-certified operators and part-91 operators. Could you comment in general on your thoughts, and anybody else that wanted to comment on that, and then I will be more specific with my follow-up.

If I need to give you a better question, do you think it is okay to operate under proper circumstances under 91 as well as 135? More specifically still, paratroopers, short notice, special missions, work contract carrier under part 91, significantly different from troops being transported from point A to point B, not to jump out of the airplane, but to walk in and to walk out.

General SMITH. I think I understand part of the question, sir, but could you be a little more direct in what you are asking me, please?

Mr. HAYES. Okay. At Fort Bragg, there is a history, 20-some years of very safe operations, with a private contractor who operates under part 91 on a moment's notice. In the past, if you called him up and say, okay, we need to drop these guys at such and such a zone. In all its wisdom, the Pentagon came up and said, okay, we are going to have everything under part 135 no matter what, and that is going to make life safer. Do you agree with that? I am only asking you to take on the Pentagon. Don't stick your neck out. [Laughter.]

General SMITH. That is why I asked you for a more direct question. My area of expertise, of course, is in the safety realm, and we have not seen anything, of course, that shows that there is a problem with contract safety. But in trying to compare those two, that really is out of the scope of what I do for the Army. I am not trying to skate out on it, but that really is outside my realm.

Mr. HAYES. Okay. Anybody else want to express an opinion on that? I have been trying to get the assets for the folks in uniform available.

Mr. BOLKCOM. Sir, are you speaking of contract aviation? I apologize. I am unfamiliar with the terms you were using. When you say "contractors," are you talking about aviation or ground transportation?

Mr. HAYES. Private contractors furnishing an aircraft for specific missions.

Mr. BOLKCOM. Okay.

Mr. HAYES. In the past, they were under part 91. You may not be familiar with the difference between 91 and 135; 91 is business; 135 is air taxi.

Mr. BOLKCOM. I am not familiar with the specifics of contract aviation, but I will tell you that compared to commercial aviation, writ large, commercial carriers, class A mishaps are 81 times more frequent in the military. Class A mishaps or their equivalent in the commercial world is .032 over the time period we are talking about. In the general civil aviation area, the record is actually very similar to what you will find in the military, or maybe even a little worse, 3.0 to 3.5 class A mishaps per 100,000 flight hours. So I do not know if that would be relevant to contractors, they are par for the course of civilian aviation.

Mr. HAYES. That probably does not get to the heart of what I am saying. I guess to simplify it, the commander at a post or wherever in my opinion should have the flexibility, because if he did not have the judgment to be the officer that he is, then he should not be there. Again specifically using this incident, it happens in other locations as well. There is a private contractor who is a 91 operator, and he has a long history of safe operation. He provides good service, but now the Pentagon comes back and says, Okay, you have to go through all the routine and the paperwork and the extra expense of becoming a part 135 operation.

In reality, nothing has changed except it is costing him more money. Now, if I can get anybody to stick their neck out and say that does not sound like a great idea; we need to look into that further, that would be appreciated. If you all do not want to go there, I can understand that as well.

General HESS. Mr. Hayes, I will meet you half way. I will look at it further. [Laughter.]

Mr. HAYES. I appreciate that.

The next comment, how much has the airplane availability improved since Mr. Gibbons came to Congress? Do you have a lot less broken airplanes now? We will keep him here then. [Laughter.]

Last question, and this is a general observation. I told him I was going to ask you that, so I got clearance. [Laughter.]

Years ago, when Mr. Skelton and Mr. Gibbons maybe, and I started flying, you took a weapon and attached it to an airplane. The process is almost completely reversed. You have an airplane and it becomes a systems platform, and your pilot is much more of a systems operator than he is an aviator. He still has to do both, but it has kind of flip-flopped.

Does that have any impact, those of you who are experienced, on the accident rate? Is that a way we can look at improving our safety record, given the fact that if we gave you more money and more gas and more tires, they get more sea-time flying the airplane, as well as the required time to operate all these sophisticated systems. A 21-year-old guy or lady, as smart as they are, with all this equipment, and they are strapping a rocket to their rear end, and away you go. Do you have any thoughts on that?

Admiral BROOKS. Sir, I would offer, I think it speak to the heart of the training issue. To reflect on your comments, if you go back 15 years ago in aviation, we were much more an iron bomb-type outfit, 15 or 20 years ago. If you move it forward, now we are much more of a precision weapons outfit. To me, you have to make sure training keeps pace with that. You do not want to be training like you used to for iron bomb-type deployment. You want to be training for precision weapons, as you mentioned.

It has kind of changed. So I think what we have to do and what we are working hard to do is make sure we have that training piece right, that we are training the kids to go out and do the things you want them to do, giving them the systems that they have today, and evaluate your training from previous periods and have some of that fall out, and then direct it in the right areas.

Mr. HAYES. Good point. My point is, make sure we give you enough money so the men and women flying get plenty of time flying the airplane, to match the time they have to spend learning and practicing operating those sophisticated systems.

General SMITH. If I could, sir, on the Army's side, with the Apache Longbow, the digital technology is well received by our young generation. If I could just give you the feedback from my son who flies those aircraft, he goes, I don't know why you old guys have a problem with this; I like it. And he really does. He naturally adapts to it. And you are correct, all we need to do is give them the time to fly it.

Mr. HAYES. Thank you all for looking after our folks, and we appreciate your being here.

General HELLAND. The advance of technologies has its good and its bad points. The good points are that those of us who flew 100 years ago, you were using crank radios, literally, with a handle on them that cranked. Today, it is digital. It automatically comes up and the workload in the cockpit is reduced. So therefore the pilots have more time to concentrate on flying, rather than to look around the cockpit to find something to do.

On the other hand, you certainly can get into overload if your systems are too much for you, but if you think about that, the technology is good. It carries over into simulators. Simulators today are absolutely spectacular. They can do everything you can do in the air, you can in a simulator. We, the services, across the board are capitalizing on that. That will help to reduce accidents and improve safety.

Mr. HAYES. They are great. I do it once a year.

The CHAIRMAN. I thank the gentleman.

Ms. Davis.

Ms. DAVIS OF CALIFORNIA. Thank you, Mr. Chairman, and thank you gentlemen for being here.

The CHAIRMAN. Ms. Davis, if I could ask your indulgence. I missed Mr. Ortiz and he was next in line.

Ms. DAVIS OF CALIFORNIA. Of course, Mr. Chairman.

Mr. ORTIZ. I know he did that on purpose, but that is fine. [Laughter.]

The CHAIRMAN. The gentleman is recognized, the gentleman from south Texas.

Mr. ORTIZ. I have a very short question. I have a Texas delegation meeting at 12:30, but one of my questions, Admiral Brooks, referring to what my good friend Congressman Kline was referring to, the T–34s. How old is the newest version of the T–34s?

Admiral BROOKS. I am sorry, sir.

Mr. ORTIZ. How old is the new version of the T–34s?

Admiral BROOKS. How old is the new version?

Mr. ORTIZ. How old is it?

Admiral BROOKS. I would have to get back to you the exact date. I want to say it is probably 20 years.

[The information referred to can be found in the Appendix on page 182.]

Mr. ORTIZ. Do you feel that it is still adequate to be used? I know that it is getting pretty old. According to what I see here, most of the accidents, with all the training that is being conducted, occurs with the T-34s. Is it because of the age of the trainer?

Admiral BROOKS. No, sir. We have not seen that. As with other platforms, what we see is again it is this human error that comes into play where it is controlled flight into terrain, out of control flight. It is that human mistake factor. We do not see anything to tell us that it is the material condition or the age of the aircraft that is the problem.

Mr. ORTIZ. Do you have a built-in system to check stress on parts, that is automatically building to check stress?

Admiral BROOKS. Specific aircraft have that system, sir. I would have to take it for the record and get back to you if the T–34 has something like that.

Mr. ORTIZ. We thank you and we thank the panel of witnesses for being with us today. Thank you very much.

The CHAIRMAN. I thank the gentleman.

Mr. Miller.

Mr. MILLER OF FLORIDA. Thank you, Mr. Chairman.

Admiral, if I could also follow up with my colleague Mr. Ortiz and Mr. Kline as well about the T–34. You talked about in your testimony the operational risk management program. It included the T–34. I would like to know, can you tell me now or provide me with an operational risk management (ORM) review for that aircraft? Or is it easier to provide us a copy of just the management review for the T–34? There obviously is some concern with the aircraft, the number that was talked about, 11.12.

I think we all would like to see what is going on with that particular aircraft because of the fact that there is a robust purchase underway now for the T–6 through the Air Force. The Navy obviously was supposed to be buying at the same time that the Air Force was, and that buy has been pushed off. I was under the impression that actually the buy would be possibly sped up in this year's budget request. It was not. It continues to be pushed out further.

Admiral BROOKS. Sir, on your second point, I could get information on the buy. I cannot speak to that, not in my area of expertise. On the mishap rate and the ORM practices for the T–34 specifically, what I could do is talk to the chief of naval air training and get that specific piece for you, to feed it back to you, if I can do that, sir.

Mr. MILLER OF FLORIDA. That would be fine.

General HELLAND. If I may, sir. There might be a misunderstanding here. The numbers that are being looked at, and I wish Congressman Kline was still here, but in my report, I report on Marine aircraft, and yes we did have two accidents in the T–34 in the Marine Corps. These aircraft are out at Yuma, Arizona and they do supply support missions. We have a very small number out there, like four, and two accidents when you only have four aircraft that do not fly more than maybe a few hundred hours a year, produces a high accident rate. In reality, it has only been two accidents in over 12 years.

So to say that about the T–34, I think again the tyranny of numbers. I think the admiral has a better number on his status sheet that reflects the training command that is down in Pensacola, and not in an anomaly that is out in Yuma, Arizona.

Admiral BROOKS. Yes, sir. When we provided the data, we broke it into Navy and Marine Corps pieces. As the general says, his is a very small population where if you have one or two mishaps, the rate skyrockets. What I show for the Navy side for the vast majority of the T–34s I reported, we have had in 10 years 10 mishaps, a lot of flying hours, and an overall mishap rate of .62.

General HELLAND. I think that is pretty realistic, sir.

Mr. MILLER OF FLORIDA. Thank you. I do represent Naval Air Station Pensacola and Naval Air Station Whiting Field, so we see the T–34s in the air quite frequently.

General Helland, you had said, actually it was to General Hess, but General Helland had said that the Marines are talking about bringing the V–22 in in 2009. Is that correct, sir?

General HELLAND. No, sir, that is incorrect. I would like to use this opportunity to change it. It is in fact coming in in fiscal year 2007.

Mr. MILLER OF FLORIDA. That kind of answers the question, because General Hess, I was under the impression that the CV–22 that is coming in to replace the Pueblos was going to be coming online sometime in the 2008 time frame. Is that still correct?

General HESS. That is my understanding, but let me double-back on that and make sure that is the correct date, sir.

Mr. MILLER OF FLORIDA. Thank you for your testimony.

The CHAIRMAN. I thank the gentleman.

The gentlelady from San Diego, Ms. Davis.

Ms. DAVIS OF CALIFORNIA. Thank you, Mr. Chairman, and again thank you all for being here.

I appreciate your going back. I know that it can be difficult sometimes in comparing numbers within and among the training commands in terms of the costs and mishap rates, but they are obviously important in understanding those best practices and important information that I am sure you always want to be very specific about those as well.

I wondered if you could just talk a little bit more about the human factors research and development. When we look at that, number one, I think in the scheme of things, do you think that we are investing enough? What grade do you think we should receive in the amount of time and effort that is devoted to that? Within that research, is there enough focus put on the human interactions with flight controls and with cockpit displays? What kind of information do we get from those who are training? What are the surprises? Are we able to follow those and understand the extent to which sometimes there is too much information for single-seat pilots, for example, in the F/A–18s and F–16s. Is that an issue and how much do we apply to knowing and understanding those particular issues?

Admiral BROOKS. I guess I would answer as far as a grade, we have been doing this for a while at the naval safety center, exploring the human factors issue. But I think it is still early in the process to get a better feel for what we are really looking at, and second, where we need to go. As far as a grade, I would probably give us maybe a B about now because we are engaged in trying to figure out the important issues we have to go after.

I think the good story here is that recognizing what we have done and working with General Hess as part of the DSOC task force, we have expanded our effort to pull in representatives from the other services, to go to the other professionals both inside the military and outside the military to find out what they are doing in this world; for example, checking with the airline industry to see what type of things they are doing that we could perhaps pick up on.

One area that I think we have learned a great deal on, however, is after an accident or a mishap occurs. I think in the past, we tended to look at it and say, well, it was human error, the pilot made a mistake. Today, what we tend to do is run the thread back all the way from when an incident happened to figure out if there is a supervisory error that perhaps occurred, to run it back and see if there is anything else that may have contributed directly to the end-state.

I think years ago, we probably looked at the end-state and said, well, he made a mistake, when the real question is, why did that individual make that mistake. Was is something that was happening in the command? Was is something in his personal life that was stressing him or her? Is it something that maybe we should have recognized and taken that person off the flight schedule. So I think as we pull this thread, that is where it will take us. I would give us a B for effort now, but we have much work to do.

To comment on your displays and controls, I do not think we are doing that much there right now, but we are probably going to get there as we continue down this path. So I think it is the area that we really have to get a better feel for, because that is what we have to attack if we are going to get our mishap rates down. It is still in my case 83 percent in some form of human error.

As I was saying before in my testimony, part of that, a small part may be disregard for rules and regulations. You can approach that one way and resolve it, but getting at that human mistake is very, very challenging, but I think we have the right people on the team now, working it jointly with all the services, and we will see where that takes us.

Ms. DAVIS OF CALIFORNIA. Sometimes it is challenging the basic assumptions about the way that controls are engineered or where they are placed.

Admiral BROOKS. Yes, ma'am. I think, as I said, we will look at those type of things as well as we pursue this effort.

Ms. DAVIS OF CALIFORNIA. Okay.

General SMITH. If I could add, to Admiral Brooks. From the helicopter perspective, as the margin of error gets more and more narrow, situational awareness of course becomes more critical. That is where we find our pilot errors. So anything we can do to provide better visualization or touch sensory to the Army is a big deal. I give you the example of in OIF, in-theater in Iraq, we had 75 percent of all of our accidents last year were brown-outs, where the pilot was trying to land to the ground and lost situational awareness.

In the program that the Navy is pushing forward with the tactile vest where you can actually feel whether you are moving left or right with that aircraft when you cannot see, is a big deal.

Ms. DAVIS OF CALIFORNIA. Yes.

General SMITH. Technologies that would provide some way to see through the dust is a big deal. So from the Army's perspective, we are very interested and driving forward in those two areas.

Ms. DAVIS OF CALIFORNIA. Yes. I noticed in your written statement the operational risk management assessment system. Is that what you are referring to? As I look at that, I think I am wondering why haven't we done more in this area?

General SMITH. That actually is a Web-based technology that we are using to help people do risk assessment, so that the pilot can look at our databases and start off and see something that looks just like his flight profile and compare risk, and then actually find control measures for it and do it in an automated fashion, so it is not really in the aircraft.

Ms. DAVIS OF CALIFORNIA. Yes.

Admiral BROOKS. The system that I referred to in my statement is a, ORM, first of all, let me say has been around for a long time, for about 10 years. We have been working through it and trying to employ it the right way, trying to use it the right way. The system I referred to is a computerized system where we can take the principles of operation risk management, give them to a squadron commanding officer; he can enter this system, run through what he knows about his command, and come up with a safety climate to kind of trigger him for certain areas he should focus on more than others. So it is a computerized system to apply ORM principles.

Ms. DAVIS OF CALIFORNIA. Thank you.

Yes, go ahead.

General HELLAND. We are not stopping there, though. Those are just tools that can be used to help the squadron commanders and to help the pilots make a determination whether or not their flights are good to go, and to fly. Every Marine squadron that deploys takes a flight surgeon with them, physically in the squadron, physically part of the squadron. They become like part of the family, so if he sees or she sees anything going on that is not in good keeping and not in good standing with safety, they can stop the chain of events. I think that is very proactive. In fact, anyone whether he is Lance Corporal Helland or Private Helland or Sergeant Helland sees anything in the mishap chain that he does not like, he can break it and stop it. So we are being very proactive in that regard with human factors.

Ms. DAVIS OF CALIFORNIA. Yes. Okay, thank you. I appreciate that.

Thank you, Mr. Chairman.

The CHAIRMAN. I thank the gentlelady.

Let me ask just a few questions here before we close. General Helland, I am looking at the class A mishap rate in 2001 for AV–8B at 3.17. Then it went to 7.12 in 2002, and 6.57 in 2003. What do you think happened here?

General HELLAND. I think it is a combination of flight time and aggressive environment. I do not have them listed in front of me, but I think about the pilot that had 69 flight hours total in model, and he was out doing ACM, which is air combat maneuvering.

The CHAIRMAN. Are you saying they did not have enough flight time?

General HELLAND. No, sir. I cannot make that judgment personally. I am just saying that sets an example that perhaps more flight time would have helped. Maybe he personally got ahead, behind, or the aircraft got away from him. It is like a guy driving his car down the roadway way too fast and he does not see black ice. As soon as he gets on top of it, he goes, oops, I am here and he punches out or he bang into the side of the road.

I am thinking about the gentleman that did a controlled landing to the back of the amphibious ship and landed in water, just landed in the water. I cannot answer why he did that. So I do not know how to answer your question about what I think the problems are.

The flight time was down during that time frame, the number of hours flown, so the rate is high, but that is the best I can do for you, sir.

The CHAIRMAN. Why don't you walk through the history of the AV–8B, because we had a hearing on this several years ago when the AV–8B rates were up high. As I recall, at that point we had crashed roughly one-third of the fleet. What percentage is it right now?

General HELLAND. Sir, I do not have that number. I will have to take that for the record and get back to you.

[The information referred to can be found in the Appendix beginning on page 177.]

General HELLAND. We first started out with AV–8 program with the AV–8A, as you recall. The AV–8A has been out of the Marine Corps inventory now for 17 years, so we are not flying the AV–8 anymore. If you take a look at the AV–8A accident rate, it was not declining. It was rising. If you take a look at the AV–8B accident rate from when it first came into the Marine Corps, it has in fact been on the decline the whole time.

The CHAIRMAN. It has not been on the decline for the last couple of years, because it went back up from 3.17 to 7 and then almost 7.

General HELLAND. Yes, sir. Again, the reduction in flight hours.

The CHAIRMAN. But that is based on flight hours. That is 3.17 per 100,000 hours.

General HELLAND. 100,000 hours, yes, sir.

The CHAIRMAN. So those are not gross numbers. That is a rate. The rate went up.

General HELLAND. Yes, sir. And that was one accident, one single accident that year that had a 3.17. The next year, we had three accidents, and that is 7.12.

The big thing we have done in the AV–8 program, and I think that is important, is in the year 2000 we did that tremendous stand-down and we took a look at the aircraft itself and we fixed the engine, and we did exceptional programmatics with it to make sure that it was ready to go.

The CHAIRMAN. That is when Jim Jones went over to basically meet with Rolls Royce and told them that they were going to have to do a re-scrub on this engine. Is that right?

General HELLAND. To my understanding, sir. Yes, sir.

The CHAIRMAN. As I recall, the testimony was that following that renewed effort to fix the engine problems, your rates, at least that were attributable to engine problems, went down.

General HELLAND. Yes, sir. We also did a program called HARP where we took the experts from the civilian community, from the contractors, and we all got together and we talked about a number of initiatives that we could do to improve the performance of the aircraft and reduce the mishap rate. They came up with something like, I am guessing now, about 78 to 80 different items that had to be done. We invested about $175 million in the program, and that really brought us some good benefits back. We still have that process ongoing today, where we take the mature knowledgeable engineers and technicians, and keep them around at the squadron level to reinforce what needs to be done on the airplane.

The CHAIRMAN. Have you made any requests for safety mods on the AV–8B that have not been supported, that have gone unfunded?

General HELLAND. Not to my personal knowledge, sir.

The CHAIRMAN. Could you check on that?

General HELLAND. Yes, sir, I will. If it is in operational safety improvement and OSIP or if it is an engineering change that has to do with safety, and I would ask Admiral Brooks to comment on it, that receives priority from Naval Air Systems Command on any weapons system or airplane that we fly.

The CHAIRMAN. I understand that it receives priority. Are they fully funded? Because there are a lot of things that are important that because of budget constraints over the last several years, we have not funded. When you say "receives priority," does that mean that all your requests have been fully funded?

General HELLAND. I do not have the programmatics with me here today, sir. I will take that for the record and get back to you, if that is permissible.

The CHAIRMAN. Okay. Tell me how the AV–8B has worked out in the Afghanistan-Iraq theaters.

General HELLAND. They have done superbly. I can give you some actual numbers of flight time and performance. We will start with Afghanistan first. In Afghanistan, they flew 1,686 sorties for 5,936 hours. They maintained a mission readiness of 83 percent. As I mentioned before, the pilots are receiving 28 hours per month. Fifty percent of that time was at night. I picked on Afghanistan because is it a very extreme environment. They start out at one-mile high, 5,000 feet above sea level. They deal with high winds. They are flying at night. They have to deal with tracers, mortar rounds and all the harsh environment that is going on around them. The only incident we had was the nose gear landing, and we do not have any combat losses or loss of life in Afghanistan.

Moving on to Operation Iraqi Freedom, the AV–8 maintained the operational mission capable rate of 79.3 percent, which by the way is over 3 percent higher than the CNO's requirement. It flew 2,186 sorties for 3,026 hours. It performed all the missions. It landed on roads; it landed on forward operating bases; it flew from the amphibious ships. Sixty of the 76 air frames were located on amphibious ships, not aircraft carriers, sir, but amphibs, and the other 16 were ashore flying from roads and forward operating bases. Again, as in Operation Enduring Freedom, there were no combat losses in Operation Iraqi Freedom for the AV–8B.

The CHAIRMAN. General, do you have any personal conclusions that you have drawn with respect to the increased mishap rate when it went up from three to ride at seven for two years?

General HELLAND. No, sir, not personally.

The CHAIRMAN. What do you think? Do you think that it is still a good bird, still worthwhile?

General HELLAND. Yes, sir.

The CHAIRMAN. Still safe from your perspective?

General HELLAND. Yes, sir. With continued attention to detail, with continued training, with level readiness that we keep the aircraft at its best possible standard, and we continue on with the education of the pilots and the crew and the maintenance. It is a supportable aircraft. It brings incredibly unique capabilities to the Marine Corps.

The fact that it is forward-deployed with the Marines, and if you think of it, sir, as a weapons system and its job is to provide combat support to the main focus of effort, which is the ground combat marine out there, living on the ground, fighting out of the foxhole, moving and fighting and communicating. He has the capability, or looks over his shoulder, and he sees the air wing of the Marine Corps standing right behind him, that is a tremendous plus for what he does. It can drop precision munitions at night, day, all weather, and tremendous capability that we look forward to improving when the Joint Strike Fighter comes in.

The CHAIRMAN. Let me ask a couple of other questions here about the comparison of our accident rate, Mr. Bolkcom, with the accident rate of foreign militaries, foreign aviation programs. Have you ever taken a look at that?

Mr. BOLKCOM. Sir, I have.

The CHAIRMAN. How do we stack up?

Mr. BOLKCOM. I can only really give you a qualitative assessment. Unfortunately, there is no standardization between countries in how they report and record keep. So Belgium, Germany, France, whomever, quantify their information differently and call class A something different. So there is really no empirical comparison that can be made.

But my general sense is that we do quite well, probably on par, if not better, than a lot of our NATO allies. Again, that is a qualitative assessment, not anything empirical.

The CHAIRMAN. Okay. You heard earlier questions. General Helland was asked why his rates seemed to be higher, especially in certain aircraft. The answer was that you can get a lot better rates if you fly big aircraft for long periods of time at 40,000 feet instead of having to get down and hug the ground on relatively short missions, which translates into a higher mishap per hour flown rate. Do you basically agree with that? Do you see any variance between the services that requires addressing?

Mr. BOLKCOM. I do agree in principle. I think that statistics can be useful, but they are certainly only part of the story. I think we rely a lot on the class A as our yard stick, but as other people mentioned, there are many other factors to consider, like fatalities and the rate of fatalities and the like. Clearly, the services operate differently. They focus and emphasize different missions. The Air Force does have 600 airplanes that are multi-engine tankers that do fly more benign flight profiles. You cannot ignore that.

I will say that I think most of the services would agree that a culture change over time, leadership over time has really made the biggest difference in our historical improvement. The DSB found that as well, that leadership is key. So I would not want to suggest that leadership is superior in one or deficient in another, but because of that you cannot ignore cultural, organizational and leadership issues as well.

The CHAIRMAN. Okay. Incidentally, General Helland, before we leave AV–8B, too, when you are undertaking this analysis on these last five mishaps, and you obviously do not have an answer yet on those. Unlike a couple of our members who are especially interested in this, perhaps headed up by Mr. McKeon, to at least engage with our staff with your investigative team, and have a chance to take a look at the present state of affairs, the present state of the investigation, and where it is going, without coming to any conclusion, but at least to see how the process has progressed at this point. Is that something you folks can accommodate?

General HELLAND. Yes, sir.

The CHAIRMAN. Okay. We will have them interact with you. Mr. McKeon will contact you here shortly. We will work on that.

[The information referred to can be found in the Appendix beginning on page 177.]

The CHAIRMAN. General Hess, you mentioned that 70 percent of Air Force passenger aircraft have the so-called traffic collision avoidance system. All commercial aircraft, as I understand it, have had this system since 1993. Is there any reason for not having the other 30 percent of our folks hooked up?

General HESS. The only reason I can give you, sir, is that based on the funding profiles that we have to put the systems in the airplane, we are kind of flagging the fight here by comparison to commercial industries out there. We are also working on a time line to have it done by 2005. I cannot tell whether or not the current stream of funding will make that complete by then, but we are certainly moving as quickly as we can to have some sort of that technology on all of our troop-and passenger-carrying airplanes as soon as we can possibly get it there.

The CHAIRMAN. Okay. We heard earlier about the prioritization that is given to safety-related funding. With respect to this system, that prioritization has not been given?

General HESS. It has a priority, sir. I do not know, to go back and answer the question, has it been fully funded. I cannot tell you that answer to that.

The CHAIRMAN. It looks like it hasn't, if only 70 percent are hooked up at this point, unless we have a pretty slow rate of acquisition.

General HESS. I will get the details for you, if you will approve me to do that.

The CHAIRMAN. Okay. You talked about the Aircraft Structural Integrity Program, and we are trying to address fatigue damage. The testimony I take from each of you is that there has been a minimum of fatigue-related incidents in recent years. Now, we are operating these aircraft at an unprecedented age level.

If you look at tankers, look at bombers, for example, the B–52s, but I think two-thirds of our naval fighter aircraft now are over 15 years old. I think your Army helicopters average out at about 18.6 years; lots of old stuff out there. Is the risk of material failure much higher than you think it was 15 years ago?

General HELLAND. Sir, if I may. I think that our inspection process and the increasing technology that is available to organizations like Naval Air Systems Command and to the depots to find any type of hint or something that is going on with an air frame is tremendously better than it was 15 years ago. We have ultra-sound systems and inspection systems today that we never even thought were available.

The CHAIRMAN. So you think the warning system for material failure is probably better than it has ever been?

General HELLAND. Yes, sir. I would have to say that because of the advancement in technology.

The CHAIRMAN. Okay. Anybody disagree with that?

Admiral BROOKS. I would tend to disagree. I would add an additional comment that we also pursue it differently now. As I mentioned before, Naval Air Systems Command stood up an aging aircraft team to watch those type of things. So they have the technology, but they also have the commitment and the realization that with older air frames you have to watch stress on the aircraft. You have to monitor fatigue life very closely. So I think we do a much better job today, because some of the aircraft are a little bit older.

General SMITH. Sir, for the Army, as we bring aircraft back from theater, of course, the recap program where we try to bring the aircraft back to pre-war state. From a safety perspective, we think that that is critical, so that we can maximize the inspection process to find out really what that means to us with an older aircraft.

The CHAIRMAN. Okay. General Hess, you had mentioned that national and international airlines have embraced flight operations quality assurance programs for years, but the Air Force is still validating its feasibility. How long are you going to validate?

General HESS. We are executing a contract probably as I speak here, Mr. Chairman.

The CHAIRMAN. That is real good. [Laughter.]

General HESS. But seriously, the flight operations quality assurance thing has been funded at about a $9 billion level so we can go out and do some very constructive tests to try to see what information we can pull out of flight data recorders that will give us some preemptive look at mishaps that could be avoided. We are testing.

In the C–17, we have a T–6 program ongoing. We are going to target an F–16 unit. We have not identified that yet. It will either be with Air Combat Command or Air Education and Training Command, as well as using the DB fleet at Andrews to try to look at the amount of information we can get and how we can best use it to do mishap prevention.

The CHAIRMAN. Okay. General Hess, you are head of the Aviation Safety Improvements Task Force.

General HESS. Yes, sir.

The CHAIRMAN. Have you made any requests for funding for systems that have not been fulfilled?

General HESS. No, sir. We are not at that stage yet. We are just in the infancy of putting our organization together. I fully expect that one of my responsibilities to Dr. Chu and to the Department is to identify those areas where we believe that there are technology or improvements that require funding.

The CHAIRMAN. Okay. Let me ask, for all of you, one other question with respect to old versus new. We have asked the question in several different ways, would having new platforms depress the accident rate. The answer has been generally no, because it looks like we are maintaining pretty well, even with the older equipment.

Let me ask it another way. You have a lot of new safety-enhancing systems like the ground proximity warning systems, terrain avoidance systems, moving map displays, things like that that would seem to enhance safety. So if you asked the question the other way, that is, without saying that old systems are not necessarily more dangerous, isn't it true that systems with these new safety devices, aren't they safer than the systems that do not have them? It is another way of asking the question. Don't these new systems make aircraft safer, and if we had them fully deployed, wouldn't we have a lower accident rate?

Mr. BOLKCOM. If I may start out, sir, I would say that I would expect these systems to contribute more to safety. My perspective is that heightened awareness, organizational attention to safety, implementing procedures and processes like ORM really have the big payoff and will continue to.

The CHAIRMAN. But that is what this does. You get heightened awareness from a ground proximity warning system, right?

Mr. BOLKCOM. Agreed.

The CHAIRMAN. I presume that tells you when the ground is getting close. Right?

Mr. BOLKCOM. Yes, sir. Agreed.

The CHAIRMAN. It is called heightened awareness.

Mr. BOLKCOM. Yes, sir.

The CHAIRMAN. So wouldn't you say that this proposition offered up is true? If we had these systems in place, we would have lower accident rates, generally.

Mr. BOLKCOM. I would hope so. Yes, sir.

The CHAIRMAN. But do you think that would follow?

Mr. BOLKCOM. Yes.

The CHAIRMAN. Okay. General Hess, what do you think?

General HESS. I would agree with you, Mr. Chairman.

The CHAIRMAN. General Brooks?

Admiral BROOKS. Sir, I would agree with you, that they will contribute, but they are part of the solution. I will give you an example. At times we have pilots who make gear-up landings. When they make those gear-up landings, sometimes they have lights going off to tell them their gear is up, and they have a voice going off telling them their gear is up, but it happens. So it contributes. It can certainly make things better, but it is one big piece. It is leadership, it is the technology, it is all those things combined.

The CHAIRMAN. Okay. General Helland?

General HELLAND. Sir, I wholeheartedly agree. It is one of the tools in the kit bag that needs to be applied to safety across the spectrum. If you can do anything to enhance a weapons system to make it more safe, it should be done.

The CHAIRMAN. Okay. But in your estimation, General Helland, are there any systems out there that are safety-enhancing that could be applied to the AV–8B program, that we have not stuck on those platforms?

General HELLAND. Sir, I will have to research that for you.

The CHAIRMAN. Does anything come to mind that you would look at?

General HELLAND. Sir, it has a radar. It has a flare. It has an altitude warning system in it. I would have to go back and ask the pros that know more about the aircraft system itself and see what is doable and what is in the realm of the possible, and would bring the best benefit for the investment.

The CHAIRMAN. Okay. If you could take a look at that and maybe get back to us for the record, if there are other systems out there that would enhance the AV–8B's safety, that would be really good.

[The information referred to can be found in the Appendix beginning on page 177.]

The CHAIRMAN. General Smith, any comment on that?

General SMITH. Sir, I totally agree with you. I think that any technologies that help in terms of situational awareness would be very helpful in the future, and those things again specifically for us that had to do with as you get closer to the ground, landing, being able to support a better situational awareness.

The CHAIRMAN. Are these systems, the ground warning systems and terrain avoidance systems, are those considered to be safety-related programs, or are they considered to be performance-related programs? You mentioned there is a priority on safety-related programs. I guess my question is, I am trying to figure out whether they are getting the kind of funds they need and I wonder if that is a function of categorization. If we called them safety programs, would we be able to get them funded? You have all testified they would make the plane safer. How are they categorized?

Admiral BROOKS. I believe they are generally categorized as safety-related programs. I think for the most part they are pursued and they are funded, but there are some initiatives out there that we go after. This flight operations quality assurance is a good example. We need to look at it and make sure it can help us in the areas where we need the help. So I think they are funded and they are categorized as safety-related.

The CHAIRMAN. Okay. If they are categorized as safety-related, then they should be funded with priority. Wouldn't you agree with that?

Admiral BROOKS. Yes, sir, and I believe they are.

The CHAIRMAN. Okay.

General SMITH. For example, in the Army with the flight data recorders, we have a $4.3 million program at Fort Rucker right now that is testing the use of that or the safety aspect of it. But of course, there are a lot of offshoots from maintenance and other areas that will draw from it.

The CHAIRMAN. Okay. Let me see here, for Admiral Brooks, you mentioned these safety surveys in your opening statement. Is that a Navy-only program? Is that a USMC program as well?

Admiral BROOKS. It is both. The Navy and Marine Corps both conduct safety surveys where we send a team from the Naval Safety Center comprised of approximately 10 to 12 individuals who will go into a squadron in aviation command. They will go down in the maintenance department, the operations area. They will look across the entire breadth of the command to see what kind of practices are there. Most importantly, it is kind of good and bad, but to take the good lessons and share them with other commands. So it is a very effective program for both the Navy and Marine Corps.

The CHAIRMAN. Okay. Do you see a relationship between reducing the mishap rate and your Web-enabling program?

Admiral BROOKS. Yes, sir, I do. I see it directly contributing because it puts the information in the hands of the users. Today, we run the database at the Naval Safety Center that collects the information from both the Navy and Marine Corps. Where we are going with the Web-enabling program is allowing the users out in the fleet to enter data directly into the program, but also call up information where they can generate reports. They can see how they compare to other outfits. They can also see what kind of lessons learned that out there that they want to put into play.

The CHAIRMAN. Okay. General Helland, can you give us any more information about the Crew Resource Management Program? And why are you reexamining it at this time? Is there some problem with that program?

General HELLAND. No, sir. We are trying to enhance it, make it better than it actually is, take a look at the crews that we put on the aircraft, make sure that they are the right crews with the right, if I may use the word, temperament or that they have the right capabilities, and they are all flyers, so you do not have someone flying that is not supposed to be here. The purpose of it is exactly what we are talking about today, to enhance our awareness of safety, both from the leadership angle, readiness, and from training.

The CHAIRMAN. Okay. Can you say that you think there is total cooperation and exchange and support between the Navy and the Marine Corps with respect to aviation safety? Are you guys working hand-in-glove?

General HELLAND. I will be first, sir. In one word, absolutely. We work very closely with the Naval Safety Center, and the Naval Safety Center works very closely with us. We do everything together.

Sir, if I may add, I would like to make a comment about the United States Army. As we were getting ready to put forces back into Iraq——

The CHAIRMAN. It is always dangerous when Marines want to comment about the Army. [Laughter.]

General HELLAND. Sir, they have been tremendous. They really have. We went through a very large training exercise in Yuma, Arizona. We used the lessons learned provided by the Army and they have been very open with us, very helpful in providing information on what to do and what not to do, lessons learned. It has been a tremendous learning experience for our pilots and our crews. It has been very, very helpful and very healthy for us.

The CHAIRMAN. Good. Has that been focused on the Marine replacement of the 82nd that is going to take place in Western Iraq?

General HELLAND. Yes, sir.

The CHAIRMAN. I was over there a couple of days ago with the 82nd and the 4th, and it looked to me like we are working hard to make sure we have a good ride-along program and understanding of those AOs, because those are dangerous areas of operation as we make this replacement. From your perspective, the same thing is happening in aviation.

General HELLAND. Yes, sir, very much so.

The CHAIRMAN. Okay, good. That is really important to us.

General Smith, obviously a lot of Army choppers have aged as the RAH-66 Comanche has been stretched out. The Army and the White House, I understand, are thinking about whether to proceed with Comanche. Have you developed any contingency plans to ensure that the Army helicopters remain safe if Comanche is canceled? I get questions like that all the time, too. [Laughter.]

General SMITH. Thank you, sir.

The CHAIRMAN. If you get kicked out by the voters, what will you do? [Laughter.]

I know it is a tough question, but on the other hand you have to be thinking about that.

General SMITH. I think our entire aviation community is certainly looking at that, sir, but at this point it is clearly out of my area of expertise, and I do not have the insights into what senior Army leadership is doing with it. As we were talking about earlier in terms of maintaining what we have, and we put a lot of energy into that. I am very comfortable that the Army is paying close attention to our current fleet and trying to make sure that it is safe.

The CHAIRMAN. Okay. So the record will reflect that General Smith did say that the Comanche will be canceled, but he feels comfortable with the decision. [Laughter.]

Of course, it will not reflect that, General.

General, tell us a little bit about the accident reporting automation system and whether other services can access Army mishap information through it.

General SMITH. Yes, sir. We are very excited about that. About six months ago when I sat down with the Army G–3, we started looking at where were we broken, basically. We found out that with young people, that we could not add experience to their time in the military, but we could certainly add knowledge. We tried to fill that gap with knowledge and we have been doing that through Web-based technology, and putting a lot of energy into it. This has been great team sport between everyone at this table. We are offering back and forth essentially even without cost; here is what we are doing, why don't you look at it, and if you like it, then we will try to adapt it.

We had several thousand hits. We tried it with the privately owned vehicles first, because it was easiest, and put it on the Web. It had several thousand hits within a week, where young soldiers were using it. So we are seeing that this digital technical generation likes it. Now again we are doing that for air, ground and privately owned vehicles, and we are sharing it to the services. In fact, I think the Marine Corps in particular and the Navy as well are taking us up on using it.

The CHAIRMAN. Just one last question, gentlemen. It was 10 or 15 years ago that a class A mishap was one that caused $1 million worth of damage. That was classification. Today, it is still $1 million. So the implication is that the same physical damage to an aircraft 15 years ago, because of inflation, because it ruins a certain amount of parts and requires a certain amount of repair, the same accident that would no be classified as a class A mishap 15 years ago, today now that parts are a lot more expensive and aircraft are a lot more expensive, would be classified. Are we artificially raising the class A rate because we have not adjusted for inflation? Do you see what I am saying?

Mr. BOLKCOM. I think I do, sir, if you do not mind me starting off. I understand there is some logic to making sure the threshold for class A adjusts for inflation over time. In fact, OSD did double the threshold for class A mishaps in 1989. I would just say my one regret is that when we did that, we did not change what we called mishaps. I think from a pure research perspective, when you double the threshold, you are really changing what a class A mishap is.

So it is really false today in 2004 to say, well, in 1988 our class A mishap rate was thus, and in 1992 it was this. They are really two different things now. We have doubled the threshold. So my one point would be, we should have changed the classification from class A, B, C and D, to something like class one, two, three and four, to make sure that we don't try to compare these apples and oranges as apples and apples. If we did change it, we should do that today. Call it class I, class II, or something like that.

The CHAIRMAN. General Hess.

General HESS. If I could add to what Mr. Bolkcom has said, anytime you get into this business and you try to compare statistics across decades or between services, you get into a little bit of a difficult situation. As far as the inflation is concerned, I think the difference is about $1 million to $1.3 million in that particular range there.

Philosophically when you ask yourself what happens if you change the numbers of what would cost a class A or a class I or whatever you re-term it to be, certain things happen inside a military service when you have what is today called a class A mishap with $1 million, a fatality or disability, or a destroyed airplane. That is, in the Air Force the convening authority is a four-star officer. He marshals significant resources to find out what happened and why it happened, and put prevention measures into place. Whereas a class B mishap, for example, the convening authority has gone down to the number Air Force level, so it gets a little bit less. The reviews are a little bit less stringent. The four-star probably does not even see them because of the pure volume of the numbers that happen there.

So a significant weight would then be showing up on the class B mishaps if you were to move the threshold, say, to $2 million. The court of review would have to be changed. Not that that could not be done, but then you have so many that you have to take a look at. The $1 million still does not get us a tremendous number that we look at in any particular year. I think we are looking at the right ones for that significant level of review, without changing.

The CHAIRMAN. Okay.

Admiral BROOKS. I would agree. I think the important part of this is the process that we go through, and we all have measures in play today to go after the effects and the reasons behind all the mishaps. The process is what drives that, and I think that is a good process today.

The CHAIRMAN. Okay.

General HELLAND. Sir, I will leave it to the professionals, the admirals and the generals that work in the safety business every single day and are focused on what they do as far as their comment is. From an operator standpoint of view, as a peer operator, I say yes, I would love to raise the threshold, but maybe that is not the right thing to do right now because we will not get the emphasis necessary to fix everything as we go along. That is just kind of a common sense approach.

General SMITH. Sir, we take a little bit different approach. At the Safety Center, I look at class As through Cs and look for trend analysis to decide what the Army will take a look at, what we send our centralized accident investigation teams out to do. That seems to be more helpful. So it does not bother me that the threshold is at $1 million because we take a little broader perspective on that. Other than that, I basically agree with the rest of the panel.

The CHAIRMAN. Okay. Gentlemen, thank you very much, and thanks for being before us at this important hearing today. General Helland, we will engage with this task force headed by Mr. McKeon, just to work with you on the AV–8B mishaps.

Thanks a lot gentlemen. We may have more questions for the record, so we may send you some more questions. We look forward to working closely with you. Obviously, you have a lot of stress on equipment and people in the theaters we are operating in. This is a very important issue for us, but we appreciate your efforts and hope that we can come close to meeting the Secretary's goal here, this target that he has set for you for safety. We appreciate your being here. We will work with you in the future.

Without further ado, the hearing is adjourned.

[Whereupon, at 1:20 p.m., the committee was adjourned.]

APPENDIX

February 11, 2004

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

FEBRUARY 11, 2004

Statement of the Honorable Duncan Hunter

Chairman, House Armed Services Committee

Military Aviation Safety Hearing

February 11, 2004

The Committee will come to order.

Today, the full committee meets to receive testimony from the Congressional Research Service and from the four military services on military aviation safety in the Department of Defense.

The Department of Defense classifies its aviation accident rates, also known as mishap rates, by the severity of injury or, the dollar value of property damage, as Class A, B or C mishaps. Today's hearing will review the past ten year history of the services' Class A mishaps. Class As are the most severe accidents, in which an aircraft is destroyed, damages of $1 million dollars or more occur, or the mishap results in a fatality or permanent total disability. Mishaps statistics are provided as the number of mishaps per 100,000 flying hours.

The military's Class A mishap rates have declined significantly since the 1950's. In 1950, the Air Force reported a 36 Class A mishaps rate while the Navy reported over 50 Class A mishaps per 100,000 flying hours. At the end of 2003, the Department of Defense mishap rate was about two. For the ten year period between 1990 and 2000, overall mishap rates declined from just over two to about 1.5. However, in 2002 and 2003, the Department's overall mishap rate jumped back up to about two mishaps per 100,000 flying hours.

The question is…why is this happening? As most of you know, I have been a proponent of modernizing our armed forces with new equipment, and reducing the average age of our aircraft inventories. While I understand that human factors are the most prevalent cause factors in the military's aviation accidents, I hope that today's witnesses will help the Committee understand how aircraft aging has affected recent mishap rates.

Military aviation safety is a concern to policy makers in both the Department of Defense and Congress. We want to improve aviation safety because aviation accidents erode the Department's war fighting capabilities by degrading readiness and reducing the number of aircraft readily available. Sometimes, entire fleets of aircraft are grounded during an accident investigation. Accidents also consume financial resources since damaged aircraft must be repaired, and destroyed aircraft must be replaced. Accidents are also hard on personnel. They hurt morale and cost lives. According to Department of Defense records, 3,072 people died in military aviation accidents between 1980 and 2003.

On May 19, 2003, the Secretary of Defense challenged the military services to improve accident rates. He said, "World class organizations do not tolerate preventable accidents. Our accident rates have increased recently, and we need to turn this situation around." This Committee strongly supports the Secretary's challenge to the Services.

To address this and other important military aviation issues, the Committee has invited a distinguished panel to testify before us today.

From the Congressional Research Service, we welcome Mr. Christopher Bolkom, Specialist in Nation Defense, and author of a recent report for Congress on Military Aviation Safety.

From the Air Force, we're glad to have Major General Kenneth W. Hess, Air Force Chief of Safety, and Commander of the Air Force Safety Center. General Hess also chairs the Defense Safety Oversight Council's Aviation Safety Improvements Task Force and he will provide remarks on the Office of the Secretary of Defense policy guidance.

From the Navy, Rear Admiral Richard E. Brooks, Commander of the United States Naval Safety Center, joins us.

To address Marine Corps aviation safety, we have Brigadier General Samuel T. Helland, Assistant Deputy Commandant for Aviation.

And finally, from the Army, we have Brigadier General Joseph A. Smith, Director of Army Safety and Commanding General of the United States Army Safety Center.

Gentlemen, we look forward to your testimony today.

I now recognize the committee's ranking Member, Mr. Skelton, for any remarks he may wish to make.

Mr. Bolkom, General Hess, Admiral Brooks, Generals Helland and Smith, without objection, the entirety of your prepared statements will be entered into the record.

Mr. Bolkom, we thought we'd start with you to provide an overview of the military's aviation safety processes and record.

The floor is yours. You'll be followed by General Hess, Admiral Brooks, then Generals Helland and Smith.

Opening Statement of

Representative Ike Skelton

Ranking Member
House Armed Services Committee

11 February 2004

Thank you, Mr. Chairman.

Gentlemen, welcome.

The first job I ever had was washing airplanes at the airport in Lexington, Missouri. That was in a day when aviation and safety weren't words you heard put together too often. The planes were then the hottest things going. Today, they're "vintage." That's a nice way of saying that they're old.

On Monday, I visited with the men and women who are building America's next air-superiority fighter, the F-22. The care and precision of their work was just amazing to see. Like the F-22, we have a lot of new aircraft in our budget, for all of the services. Today, they're the hottest things going. Someday, they'll be old.

Age isn't the only reason airplanes and helicopters crash more. Accident rates have a lot to do with how much we spend on spare parts, how well we finance operations and maintenance, and very significantly with OPTEMPO.

Looking at the testimony our witnesses prepared, I'm impressed that despite high OPTEMPO, despite worldwide deployments, and despite budgets that sometimes sacrifice O&M funds for modernization, flying continues to be a safe if somewhat unnatural activity.

I will be very interested to hear from our witnesses where the real strains come from in keeping flying safe. Are we working our pilots too hard? Are we training to satisfactory standards? Is there enough money for maintenance and parts?

New airplanes are nice to have. But we will be flying a mature fleet for the foreseeable future. I look forward to hearing how we're going to keep 'em flying.

Thank you all for your work, and thank you, Mr. Chairman.

DEPARTMENT OF THE AIR FORCE

PRESENTATION FOR THE HOUSE ARMED SERVICES COMMITTEE
U.S. HOUSE OF REPRESENTATIVES

SUBJECT: Defense Safety Oversight Council (DSOC) and the Department of the Air Force Aviation Safety Mishap Rates and Current and Future Aviation Safety Initiatives

STATEMENT OF: Major General Kenneth W. Hess
Chief of Safety, USAF

February 11, 2004

NOT FOR PUBLICATION UNTIL RELEASED
BY THE HOUSE ARMED SERVICES COMMITTEE
U.S. HOUSE OF REPRESENTATIVES

Introduction

Mr. Chairman and members of this distinguished Committee: it is my pleasure to be here to talk with you about our aviation safety programs. As a nation, our aviation assets are unsurpassed. We have the capability of quickly establishing air dominance anywhere our national interest is challenged and we must be able to accomplish this task without unnecessary risk to our pilots, crews and passengers. After a decade of relatively flat improvement in our accident rates, the Department experienced the first increase in our aviation accident statistics in fiscal year 2002. We are committed reducing aviation mishaps and mishap rates, , and I would like to take this opportunity to lay out our plan and ask for your support as we shape our future efforts.

In addition to being the Chief of Air Force Safety, I am also here representing the Department as the Chair of the Aviation Safety Improvement Task Force. We are fortunate to have our Secretary so committed to the safety and well being of our force as this provides us a rare opportunity to make a real difference in our safety culture.

Since taking office, the Secretary has sought to change how the Department of Defense views the safety of its military personnel and civilian employees. Our goal is zero preventable mishaps and we have taken a major step in that direction. In a May 2003 letter to the Department's leadership, the Secretary challenged all of us to reduce the number and rate of mishaps by 50 percent over the next two years. This is not "business as usual" – this requires real cultural change.

Defense Safety Oversight Council

To enable this change, the Secretary of Defense chartered the Defense Safety Oversight Council (DSOC). This Council is composed of the Under Secretaries of Defense, the Vice Chairman of the Joint Chiefs of Staff, and the Under Secretaries of the Military Departments and is chaired by the Under Secretary for Personnel and Readiness. The Council meets bimonthly to provide governance to our accident reduction efforts and ensures the personal involvement of the senior leadership. The DSOC is not a group of safety and health professionals discussing accident prevention, it is the senior management of the Department focusing on reducing the effects of accidents on the bottom line: operational readiness.

The DSOC has also been briefed by industry and government leaders who have world-class safety programs. We are looking at ways to apply their experience in the Department of Defense. For example, the DSOC has heard from government and industry co-chairs of the Commercial Aviation Safety Team, called CAST, to discuss their approach to reduce commercial aviation fatalities. Additionally, the DSOC invited representatives from the National Highway and Traffic Safety Administration to discuss their programs for reducing the largest cause of accidental death in the military – traffic fatalities.

The DSOC established several Task Forces to address these and other safety challenges. The eleven task forces recommend policies, programs, and investment to reduce accidents and injuries in the areas of Aviation Safety, Military Training, Deployment and Operations, Industrial and Installation Operations, Private Motor Vehicles to name a few. Each Task Force is charged with developing "quick wins" as well as longer-term initiatives to meet the 50%

reduction goal. The Task Forces are led by a General Officer or a member of the Senior Executive Service and are composed of both functional leaders and subject matter experts from across the Department. Each Task Force also seeks the expertise and best practices from industry and other government agencies.

Aviation Safety Improvements Task Force

The Aviation Safety Improvement Task Force is a joint team composed of leading experts in aviation safety. We have established an Executive Steering Group to provide leadership and my counterpart at the Naval Safety Center, RADM Brooks, serves as the Vice Chair. We also have representatives from Federal Aviation Administration, National Transportation Safety Board, Coast Guard, commercial aviation, and aircraft industries providing direct support to our efforts.

The key to the success of the Aviation Safety Improvements Task Force will be to use a data-driven approach to provide the factual underpinnings that support long-term risk and mishap reduction efforts. The lessons of the CAST in this respect are clear – credible results and recommendations that can withstand scrutiny must be based on fact and not on preexisting notions of problems, or solutions.

The Task Force will operate under two premises. First, we recognize that mishap prevention has been and will remain primarily a Service issue, and the Task Force will rely on each Service to pursue risk reduction levels to meet the Secretary's guidance. Nonetheless, the Task Force will review Service progress on those mishap areas with high levels of outside interest, even though the particular issue may be isolated to a single Service. The Task Force also recognizes that there are issues that cut across Service lines. In these areas, we will use our CAST-like process to identify hazards and mitigate risks, and to value the merits of risk mitigation strategies.

As I mentioned previously, if this process is to remain credible and produce recommendations that can withstand scrutiny, it must be data driven. Each Service has a good understanding of its particular problem areas, but as we attack this from the corporate level, we must have an accurate corporate picture from our mishap data. We have chartered a joint working group to consolidate each Service's mishap data into this single, corporate view and clarify any inconsistencies. This effort will identify those areas that have the highest potential payoff in reducing fatalities, the number of destroyed aircraft, and ultimately reducing the mishap rate. Similarly, we have chartered a working group to develop a standardized taxonomy for implementing the Human Factors Analysis and Classification System, which looks at human error. In addition, this group will assess the feasibility of using modern, web-based survey tools and techniques to measure organizational safety culture at the unit level. Using a common language to link HFACS post mishap analysis to precursor attitudes that influence flight safety will be a serious step forward in understanding and mitigating human factor mishaps.

Specific Aviation Safety Improvement Task Force Plans

As you know a straightforward look at Air Force mishap rates over the past decade shows only slight improvement, but a pure numbers perspective alone does not adequately describe the operating environment that produced those numbers. During this decade the Air Force got 40% smaller, but deployments and OPS TEMPO reached new highs while we sustained combat operations in the Balkans, and continued Operations Northern and Southern Watch. This was only exacerbated with the beginning of the global war on terrorism with Operations Enduring Freedom and Iraqi Freedom.

The net result of this tempo has been higher risk levels not only during combat operations, but during training and deployments as well. Taken in full context the Air Force's safety record over the past decade is exceptional. That said, the spike we experienced in 2002 mishaps was a serious concern for the Air Force. General Jumper and Air Force leaders down to the squadron and flight have worked diligently to drive that rate back down. Consequently, our mishap experience in FY 2003 was more nearly like the decade average of 1.38 mishaps per 100,000 flying hours.

Still, the larger question remains: "Can we afford today's mishap rate tomorrow?" The DSOC Aviation Improvement Task Force's data driven approach is the right strategy to identify hazards and implement controls to reduce risk in current operations. The Air Force has completed an initial 10-year mishap analysis (Attachment 1). The results of that effort point to the need to concentrate efforts in the following areas: Controlled Flight into Terrain, Powerplant failures, Mid-Air Collisions, and Loss of Control In-Flight. I'm confident that many, if not all, of these areas will surface in our Task Force study effort as well.

Key Initiatives

Over the last ten years, the Air Force has implemented several key initiatives to drive mishap rates lower, even as mission complexity increases inherent risks. This committee expressed an interest in aging aircraft and its effect on mishap rates. .

To answer this concern directly, we have not identified any aging issues that drive mishap rates. The Air Force has aggressive programs and uniform standards of airworthiness that apply to all aircraft. We have developed a structured program for assuring the operational safety, suitability, and effectiveness (OSS&E) of our systems and end items throughout their life cycle. Airworthiness Certification Criteria have been published and a single manager for each weapons system is accountable to apply these hundreds of criteria to their assigned aircraft. As aircraft age, it becomes more expensive to maintain these airworthiness standards, but this policy ensures the airworthiness standard is consistently applied.

In addition to airworthiness standards there are several other programs worthy of mention. The Air Force continues to improve our long-established Aircraft Structural Integrity Program (ASIP), which uses a systems engineering approach to control risks of structural failure. The ASIP guidance document was updated in 2002 to increase our focus on aging airframe issues, and we are now even more diligent in addressing widespread fatigue damage, which could reduce structural redundancy. The Air Force Materiel Command established an Aging

Aircraft Program Office that targets development of crosscutting techniques and equipment to predict, prevent, detect, analyze and repair aging-related problems in aircraft structures and systems. An Air Force Fleet Viability Board (FVB) stood up this last year, at the direction of the Secretary of the Air Force, to provide senior leaders with an unbiased assessment of the requirements and costs to maintain the airworthiness and effectiveness of the evaluated aircraft types. Completely independent, they are tasked to provide the best answer for our national defense and the American taxpayer.

Engine Risk Management

The Air Force uses risk management principles to manage the airworthiness of our aircraft engines. Our 10-year safety analysis showed that engines were the most frequent Class A and B mishap we experience, and the main driver of destroyed aircraft. Using a risk-based process we set threshold levels for engine-related problems based on a calculated rate of non-recoverable in-flight shutdowns per 100,000 flying hours. We then develop Engine Life Management Plans to maintain safety, combat capability and reliability of engines used in all major weapons systems for their projected service life. Much like aging aircraft issues, engines have similar challenges - these are addressed with Service Life Extension Programs (SLEP), which are mid-life engine upgrades and Propulsion Modernization Programs (PMP) to modernize older design engines with new technology hardware, to retain critical aircraft like the T-38.

Safety Investigation Process and Recommendations

A key to lowering the mishap rate is learning from our mishaps and implementing the lessons learned. In 1995, in response to recurring concerns for the independence of accident investigators the Secretary of the Air Force agreed with an Air Force Blue Ribbon Panel and directed the major commands to retain convening authority for Class A investigations, mandated safety courses for key board members, directed the Safety Center to provide a voting member on all Class A mishap investigations, and clarified the important point that *"only the voting members of a board can change the final report."* As a result, our USAF Safety Investigation Boards are more independent and their findings and recommendations are key to preventing future mishaps.

Technology Improvements

The Air Force continues to invest in technologies, like Traffic Collision Avoidance Systems (TCAS) and Terrain Awareness and Warning Systems (TAWS), whose benefits are only now being realized in our fleet of passenger and troop carrying aircraft. TCAS should virtually eliminate high fatality midair mishaps; currently more than 70% of these type aircraft are equipped with this technology and the rest directed to comply by 2005. Similarly, TAWS will prevent catastrophic losses associated with Controlled Flight Into Terrain (CFIT). At the present time over 50% of Air Force troop and passenger aircraft are equipped with this technology and the rest directed to comply by 2005.

For fighter aircraft that fly highly dynamic missions our research laboratories have pioneered advanced safety systems capable of automatically preventing ground and midair collisions: the Automatic Ground Collision Avoidance System (AGCAS) and Automatic

Airborne Collision Avoidance System (AACAS). Through advanced sensor fusion, digital terrain databases and digital fly-by-wire flight control systems, aircraft can autonomously take last-second evasive maneuvers to prevent mishaps. A production version of AGCAS is available today and AACAS has just completed research flight-testing and is at least 5 years from production capability.

Panoramic Night Vision Goggles is another area where we are embracing technology to improve safety and performance. The next generation of goggles will more than double our current field of view providing safer and more productive nighttime and near daylight operations.

Analysis

Central to our efforts to drive down mishap rates across the board will be those initiatives that will enhance mishap prevention. Operational risk management has matured significantly since introduced to the force in the late 1980s. The Air Force is teaching its tenants in all our training courses to ensure each airman understands and can use this powerful tool. Similarly, if we expect to reduce mishaps we have to know the trends and warnings available in our data. The Air Force has a significant investment in the Safety Automated System that provides a web-based mishap reporting and data management tool that allows quick, accurate tracking of mishaps and trends. Finally, for the past 3 years the Air Force has been validating the feasibility and benefit of adopting a commercial aviation best practice known as Flight Operations Quality Assurance (FOQA). This continual expert analysis of flight operations to detect mishap precursors is enabled by the routine download of recorded flight data. Through detection of hazardous operational and equipment trends, commanders are made aware of their risks and can take appropriate mitigation measures. National and international airlines have embraced this technology for years. The Air Force has commenced a $9M field evaluation program on the C-17, T-6, F-16 and Special Airlift aircraft to further develop the Military FOQA Operational Concept before widespread implementation.

Future Safety Initiatives

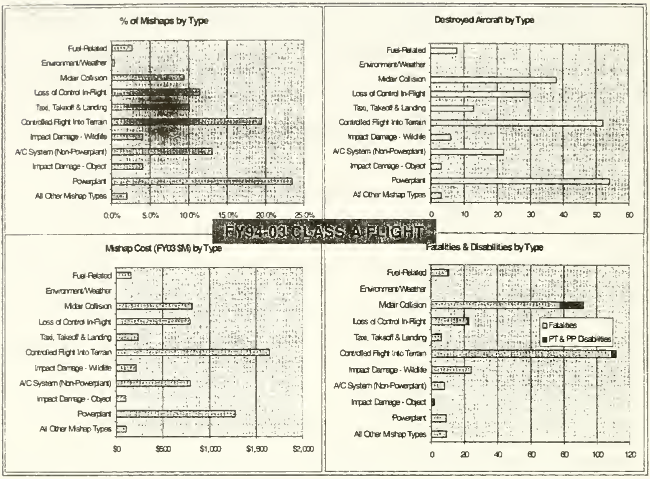
Over the past 10 years, the Air Force has lost more than 300 airmen and nearly 250 aircraft, valued at over $11 billion, in aviation accidents that shouldn't have happened and could have been prevented. It is tragic to lose members of our Air Force family, and it is unacceptable to lower our mission capability due to avoidable accidents. Safety has to be a priority for everyone.

The Air Force fully endorses Secretary Rumsfeld's 50% reduction goal, and we realize that real change has to start at the grassroots level. Commanders and supervisors are accountable for safety practices and standards and must take action to reduce mishap rates. The key to this effort will be accelerating the cultural evolution of the Air Force. To begin this effort General Jumper has established the Air Force Operational Safety Council (AFOSC), chaired by the Vice Chief of Staff, to oversee safety matters. The AFOSC will monitor safety performance, examine new or emerging technologies from both the operational and safety perspectives, and direct required changes in Air Force policy, programs, and investment.

Closing

In closing, although there is much work to be done, I believe that we can make significant improvements in aviation safety. The Secretary's 50% reduction goal is achievable and will directly increase our operational readiness. We are a world-class military and will not tolerate preventable accidents. We owe no less to the men and women who defend our Nation.

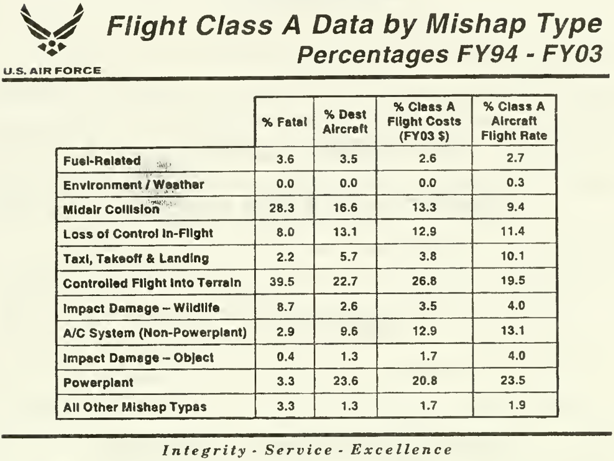
Attachment 1: Results of Air Force Safety Center 10-Year Mishap Analysis



Definitions

Controlled Flight Into Terrain - In-flight collision with terrain, water, trees or a man-made obstacle during flight prior to planned touchdown
Environment/Weather - Encounters with weather or environmental phenomena
Fuel-Related - One or more powerplants experienced reduced or no power output due to fuel anomaly
Loss of Control In Flight - Failure to maintain control of the aircraft or UAV while in flight
Midair Collision - Collision between aircraft or UAV when intent for flight exists
Impact Damage (Object) - Resultant damage to aircraft or powerplant due to impact with a foreign object or debris from another failed aircraft component
Impact Damage (Wildlife) - Collision with a bird or other animal
Powerplant - Failure or malfunction of an aircraft or UAV thrust-producing system or related components
Aircraft System (Non-powerplant) - Failure or malfunction of an aircraft or UAV system or component other than the powerplant
Taxi, Takeoff, & Landing - Operational mishaps occurring during takeoff, landing or other powered aircraft or UAV movement on prepared airfield surfaces, austere fields and helicopter landing zones
Other - Any occurrence not covered under another category

Note: Highlighted boxes represent areas the Air Force has determined to be high-value payback in dollars or lives saved for mishap prevention purposes.

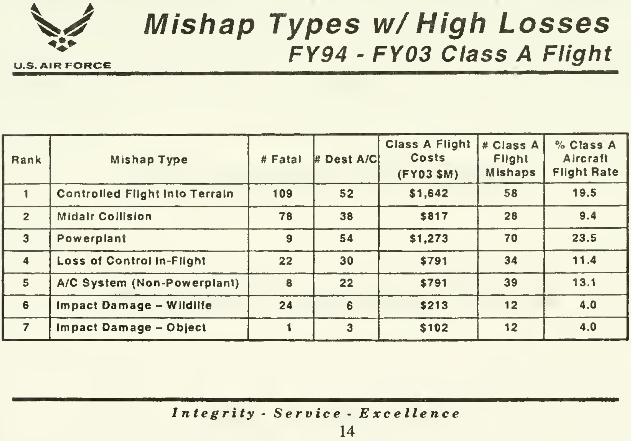


U.S. AIR FORCE

Flight Class A Data by Mishap Type
Percentages FY94 - FY03

	% Fatal	% Dest Aircraft	% Class A Flight Costs (FY03 $)	% Class A Aircraft Flight Rate
Fuel-Related	3.6	3.5	2.6	2.7
Environment / Weather	0.0	0.0	0.0	0.3
Midair Collision	28.3	16.6	13.3	9.4
Loss of Control In-Flight	8.0	13.1	12.9	11.4
Taxi, Takeoff & Landing	2.2	5.7	3.8	10.1
Controlled Flight Into Terrain	39.5	22.7	26.8	19.5
Impact Damage – Wildlife	8.7	2.6	3.5	4.0
A/C System (Non-Powerplant)	2.9	9.6	12.9	13.1
Impact Damage – Object	0.4	1.3	1.7	4.0
Powerplant	3.3	23.6	20.8	23.5
All Other Mishap Types	3.3	1.3	1.7	1.9

Integrity - Service - Excellence



U.S. AIR FORCE

Mishap Types w/ High Losses
FY94 - FY03 Class A Flight

Rank	Mishap Type	# Fatal	# Dest A/C	Class A Flight Costs (FY03 $M)	# Class A Flight Mishaps	% Class A Aircraft Flight Rate
1	Controlled Flight Into Terrain	109	52	$1,642	58	19.5
2	Midair Collision	78	38	$817	28	9.4
3	Powerplant	9	54	$1,273	70	23.5
4	Loss of Control In-Flight	22	30	$791	34	11.4
5	A/C System (Non-Powerplant)	8	22	$791	39	13.1
6	Impact Damage – Wildlife	24	6	$213	12	4.0
7	Impact Damage – Object	1	3	$102	12	4.0

Integrity - Service - Excellence

14

STATEMENT BY

BG JOSEPH A. SMITH

DIRECTOR OF ARMY SAFETY

BEFORE THE

COMMITTEE ON ARMED SERVICES

UNITED STATES HOUSE OF REPRESENTATIVES

ON MILITARY AVIATION SAFETY

SECOND SESSION, 108TH CONGRESS

FEBRUARY 11, 2004

STATEMENT BY
BG JOSEPH A. SMITH

Thank you Mr. Chairman for the opportunity to address the committee's questions in regards to Army aviation safety. As you already know, the US Army Safety Center is well recognized within the Army community as a leader in both aviation and ground safety. As the Director of Army Safety, my staff and I work diligently to provide tools and policy to ensure that our Soldiers "Make It Home Safe" everyday anywhere in the world.

The Secretary of Defense, Honorable Donald Rumsfeld, challenged all the Services to reduce accidents by 50% over the next two years starting in May of 2002. An important part of meeting this goal is conducting an analysis of accidents over the years and relevant results of this effort are provided to the committee as answers to your questions. Also, applicable past and future initiatives from across the Army Aviation community are provided to answer your questions concerning aviation safety. The most recent initiative shown in the responses is the Army Safety Campaign which I briefed to the Secretary of the Army on 22 January 2004.

Again Mr. Chairman, I welcome the opportunity to talk about aviation safety and what the Army has done and will do in the future to enhance combat readiness and ensure the safety of our Soldiers.

We are an Army at war. From my experiences in Iraq and Afghanistan, I know commanders, aviators, and Soldiers are doing everything in their power to mitigate risk. The Army is not risk averse. However, the high cost of training, combined with the harsh environments we expect our aviators to operate in daily, equals high risk.

Over the last ten years, the Army has experienced a favorable trend of reduced accident rates. However, since September 2002 and the beginning of the war on terrorism the increased operations tempo and worldwide deployments have resulted in an increase in aviation accidents.

I will now address the following questions as stated in your letter to me (dated 4 February 2004) in detail below.

Question 1: Overall service aviation safety Class A mishap rates for the past 10 years through the first quarter FY04?

Answer:

Total Army Fixed & Rotary Wing

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	1299275	23	1.77	126	9.7	16	87	22	2	1	24
1994	1275222	21	1.65	116	9.1	9	86	11	3	0	18
1995	1203699	10	0.83	95	7.89	15	70	13	1	1	8
1996	1082010	8	0.74	89	8.23	11	70	16	0	0	7
1997	952956	12	1.26	82	8 6	12	58	15	0	2	7
1998	890526	12	1.35	84	9.43	4	68	6	1	2	9
1999	912625	18	1.97	101	11.07	12	71	22	0	0	10
2000	968739	6	0.62	79	8.15	4	69	4	0	0	6
2001	978069	10	1.02	96	9.82	14	72	11	0	0	10
2002	1033962	26	2.51	116	11.22	14	78	17	0	0	18
2003	1046220	29	2.77	119	11.37	21	69	33	1	0	10
2004	302839	10	3.3	24	7.93	3	11	2	0	0	1

Question 2: Individual aircraft Class A mishap rates for the past 10 years, through the first quarter of FY04?

Answer:

AH64

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	**Hours**	**Number**	**Rate**	**Number**	**Rate**	**Number**	**Number**	**Army Military**	**DOD Civ**	**Non DOD**	**Aircraft**
1993	95276	5	5.25	17	17.84	4	8	1	0	0	5
1994	109827	4	3.64	17	15.48	1	12	0	2	0	3
1995	100629	2	1.99	12	11.92	2	8	0	0	0	0
1996	103929	3	2.89	13	12.51	2	8	0	0	0	1
1997	101808	3	2.95	14	13.75	0	11	0	0	0	0
1998	101082	3	2.97	18	17.81	0	15	2	0	0	3
1999	104881	6	5.72	27	25.74	3	18	2	0	0	3
2000	102285	1	0.98	12	11.73	0	11	2	0	0	1
2001	113097	0	0	13	11.49	4	9	0	0	0	0
2002	128841	9	6.99	23	17.85	2	12	4	0	0	9
2003	138075	9	6.52	31	22.45	8	14	3	1	0	3
2004	42242	4	9.47	6	14.2	1	1	0	0	0	1

UH60

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	**Hours**	**Number**	**Rate**	**Number**	**Rate**	**Number**	**Number**	**Army Military**	**DOD Civ**	**Non DOD**	**Aircraft**
1993	168499	1	0.59	24	14.24	6	17	4	0	0	1
1994	184527	2	1.08	14	7.59	1	11	0	0	0	0
1995	189717	2	1.05	11	5.8	2	7	5	0	0	2
1996	198144	1	0.5	14	7.07	2	11	6	0	0	2
1997	203589	1	0.49	13	6.39	2	10	8	0	0	1
1998	206064	5	2.43	22	10.68	1	16	3	0	2	3
1999	210490	2	0.95	20	9.5	3	15	9	0	0	1
2000	241710	1	0.41	16	6.62	0	15	0	0	0	1
2001	238428	2	0.84	21	8.81	1	18	6	0	0	3
2002	244932	4	1.63	23	9.39	1	18	0	0	0	2
2003	297339	9	3.03	34	11.43	6	19	24	0	0	4
2004	79848	1	1.25	5	6.26	0	4	0	0	0	0

MH60

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	6128	0	0	2	32.64	0	2	0	0	0	0
1994	13977	1	7.15	4	28.62	0	3	0	0	0	1
1995	16134	0	0	4	24.79	0	4	0	0	0	0
1996	14835	0	0	6	40.44	1	5	0	0	0	0
1997	13377	1	7.48	2	14.95	0	1	0	0	0	0
1998	12972	0	0	3	23.13	0	3	0	0	0	0
1999	13374	1	7.48	5	37.39	0	4	1	0	0	0
2000	30108	0	0	1	3.32	1	0	0	0	0	0
2001	35541	0	0	3	8.44	1	2	0	0	0	0
2002	37233	1	2.69	4	10.74	0	3	2	0	0	0
2003	16740	2	11.95	5	29.87	0	3	4	0	0	1
2004	5572	0	0	0	0	0	0	0	0	0	0

CH47D

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	60216	1	1.66	9	14.95	1	7	0	0	0	1
1994	60399	2	3.31	9	14.9	1	6	4	1	0	2
1995	59280	1	1.69	5	8.43	0	4	5	0	0	1
1996	59643	0	0	8	13.41	0	8	0	0	0	0
1997	57921	1	1.73	6	10.36	1	4	0	0	0	0
1998	50775	0	0	4	7.88	1	3	0	0	0	0
1999	53569	1	1.87	3	5.6	0	2	0	0	0	0
2000	54435	0	0	4	7.35	0	4	0	0	0	0
2001	55890	0	0	3	5.37	0	3	0	0	0	0
2002	59022	4	6.78	12	20.33	0	8	0	0	0	2
2003	62796	3	4.78	9	14.33	1	5	0	0	0	0
2004	18112	0	0	1	5.52	0	1	0	0	0	0

MH47

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	0	0	N/A	1	N/A	0	1	0	0	0	0
1994	6864	0	0	0	0	0	0	0	0	0	0
1995	8511	0	0	0	0	0	0	0	0	0	0
1996	8316	2	24.05	3	36.08	0	1	5	0	0	1
1997	7554	0	0	3	39.71	1	2	0	0	0	0
1998	7665	0	0	1	13.05	0	1	0	0	0	0
1999	8198	0	0	1	12.2	0	1	0	0	0	0
2000	18924	0	0	1	5.28	0	1	0	0	0	0
2001	16779	0	0	0	0	0	0	0	0	0	0
2002	16929	1	5.91	7	41.35	2	4	8	0	0	1
2003	7254	2	27.57	3	41.36	0	1	0	0	0	0
2004	2396	0	0	0	0	0	0	0	0	0	0

OH58D

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	24635	1	4.06	7	28.41	1	5	0	0	0	1
1994	42312	0	0	4	9.45	1	3	0	0	0	0
1995	46644	1	2.14	12	25.73	3	8	0	0	0	1
1996	62520	1	1.6	5	8	1	3	3	0	0	2
1997	63072	1	1.59	13	20.61	3	9	1	0	0	1
1998	77208	2	2.59	13	16.84	1	10	0	0	0	1
1999	75841	3	3.96	15	19.78	2	10	0	0	0	2
2000	88299	1	1.13	21	23.78	2	18	0	0	0	1
2001	88464	4	4.52	27	30.52	3	20	0	0	0	3
2002	91599	5	5.46	19	20.74	4	10	2	0	0	3
2003	96954	3	3.09	23	23.72	4	16	0	0	0	1
2004	26394	5	18.94	7	26.52	1	1	2	0	0	0

OH58

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	232154	6	2.58	17	7.32	0	11	2	0	0	6
1994	227082	8	3.52	28	12 33	0	20	6	0	0	8
1995	191685	3	1.57	8	4.17	0	5	3	1	1	3
1996	132195	0	0	6	4.54	0	6	0	0	0	0
1997	117354	1	0.85	7	5.96	2	4	0	0	2	1
1998	103365	1	0.97	2	1 93	0	1	1	1	0	1
1999	107713	0	0	5	4 64	1	4	0	0	0	0
2000	109509	2	1.83	6	5.48	0	4	0	0	0	2
2001	116958	1	0.86	3	2.57	0	2	0	0	0	1
2002	123534	1	0.81	5	4.05	0	4	0	0	0	0
2003	114711	0	0	4	3.49	1	3	0	0	0	0
2004	30270	0	0	2	6.61	0	2	0	0	0	0

UH 1

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	454618	5	1.1	21	4.62	1	15	8	1	0	6
1994	376800	2	0.53	12	3.18	3	7	0	0	0	2
1995	326199	0	0	17	5.21	4	13	0	0	0	0
1996	218685	0	0	9	4.12	4	5	0	0	0	0
1997	159291	3	1.88	9	5 65	1	5	4	0	0	3
1998	95001	0	0	1	1.05	0	1	0	0	0	0
1999	97197	1	1.03	5	5.14	1	3	0	0	0	1
2000	69870	1	1.43	1	1.43	0	0	2	0	0	1
2001	59634	0	0	2	3.35	1	1	0	0	0	0
2002	82734	0	0	2	2.42	0	2	0	0	0	0
2003	85194	0	0	0	0	0	0	0	0	0	0
2004	21825	0	0	1	4.58	0	1	0	0	0	0

H 6

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	25027	3	11.99	7	27.97	1	3	1	0	0	3
1994	18720	1	5.34	5	26.71	0	4	1	0	0	1
1995	16902	0	0	1	5.92	1	0	0	0	0	0
1996	13212	0	0	8	60.55	0	8	0	0	0	0
1997	11379	0	0	5	43.94	2	3	0	0	0	0
1998	12225	0	0	5	40.9	1	4	0	0	0	0
1999	10738	2	18.63	5	46.56	1	2	1	0	0	1
2000	26370	0	0	4	15.17	1	3	0	0	0	0
2001	27789	1	3.6	6	21.59	2	3	0	0	0	1
2002	27192	0	0	4	14.71	1	3	0	0	0	0
2003	9774	0	0	0	0	0	0	0	0	0	0
2004	3670	0	0	0	0	0	0	0	0	0	0

TH67

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1994	8949	0	0	0	0	0	0	0	0	0	0
1995	39099	0	0	3	7.67	0	3	0	0	0	0
1996	65382	0	0	3	4.59	0	3	0	0	0	0
1997	56826	0	0	0	0	0	0	0	0	0	0
1998	66072	0	0	1	1.51	0	1	0	0	0	0
1999	76580	0	0	1	1.31	1	0	0	0	0	0
2000	82977	0	0	2	2.41	0	2	0	0	0	0
2001	80418	0	0	2	2.49	2	0	0	0	0	0
2002	89745	0	0	4	4.46	0	4	0	0	0	0
2003	96918	0	0	4	4.13	0	4	0	0	0	0
2004	30709	0	0	0	0	0	0	0	0	0	0

AH 1

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	89172	0	0	11	12.34	1	10	0	0	0	0
1994	71604	1	1.4	13	18.16	2	10	0	0	0	1
1995	55422	0	0	11	19.85	2	9	0	0	0	0
1996	41847	1	2.39	5	11.95	1	3	2	0	0	1
1997	33171	0	0	2	6.03	0	2	0	0	0	0
1998	21243	1	4.71	4	18.83	0	3	0	0	0	1
1999	27415	0	0	3	10.94	0	3	0	0	0	0
2000	14274	0	0	1	7.01	0	1	0	0	0	0
2001	13266	0	0	2	15.08	0	2	0	0	0	0
2002	24	0	0	0	0	0	0	0	0	0	0
2003	15	0	0	0	0	0	0	0	0	0	0
2004	0	0	N/A	0	N/A	0	0	0	0	0	0

C 12

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	71734	1	1.39	7	9.76	1	5	6	1	1	1
1994	82401	0	0	4	4.85	0	4	0	0	0	0
1995	91140	0	0	6	6.58	0	6	0	0	0	0
1996	114273	0	0	5	4.38	0	5	0	0	0	0
1997	98025	1	1.02	8	8.16	0	7	2	0	0	1
1998	100254	0	0	8	7.98	0	8	0	0	0	0
1999	83427	1	1.2	8	9.59	0	7	2	0	0	1
2000	84918	0	0	7	8.24	0	7	0	0	0	0
2001	86784	1	1.15	7	8.07	0	6	2	0	0	1
2002	85278	0	0	4	4.69	1	3	0	0	0	0
2003	75759	1	1.32	4	5.28	1	2	2	0	0	1
2004	27066	0	0	1	3.69	1	0	0	0	0	0

C 26

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	3285	0	0	0	0	0	0	0	0	0	0
1994	8676	0	0	0	0	0	0	0	0	0	0
1995	9291	0	0	0	0	0	0	0	0	0	0
1996	13833	0	0	0	0	0	0	0	0	0	0
1997	7749	0	0	0	0	0	0	0	0	0	0
1998	7209	0	0	0	0	0	0	0	0	0	0
1999	7040	0	0	0	0	0	0	0	0	0	0
2000	7509	0	0	0	0	0	0	0	0	0	0
2001	7239	0	0	0	0	0	0	0	0	0	0
2002	7467	0	0	0	0	0	0	0	0	0	0
2003	7074	0	0	0	0	0	0	0	0	0	0
2004	2258	0	0	0	0	0	0	0	0	0	0

C 35

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	0	0	N/A	0	N/A	0	0	0	0	0	0
1994	0	0	N/A	0	N/A	0	0	0	0	0	0
1995	0	0	N/A	0	N/A	0	0	0	0	0	0
1996	0	0	N/A	0	N/A	0	0	0	0	0	0
1997	1410	0	0	0	0	0	0	0	0	0	0
1998	6306	0	0	0	0	0	0	0	0	0	0
1999	10654	0	0	1	9.39	0	1	0	0	0	0
2000	12606	0	0	0	0	0	0	0	0	0	0
2001	13566	0	0	0	0	0	0	0	0	0	0
2002	14340	0	0	0	0	0	0	0	0	0	0
2003	12726	0	0	0	0	0	0	0	0	0	0
2004	4936	0	0	0	0	0	0	0	0	0	0

U 21

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	41382	0	0	2	4.83	0	2	0	0	0	0
1994	40086	0	0	2	4.99	0	2	0	0	0	0
1995	28338	0	0	2	7.06	0	2	0	0	0	0
1996	12834	0	0	0	0	0	0	0	0	0	0
1997	1566	0	0	0	0	0	0	0	0	0	0
1998	1362	0	0	0	0	0	0	0	0	0	0
1999	1425	0	0	0	0	0	0	0	0	0	0
2000	12	0	0	0	0	0	0	0	0	0	0
2001	0	0	N/A	0	N/A	0	0	0	0	0	0
2002	0	0	N/A	0	N/A	0	0	0	0	0	0
2003	0	0	N/A	0	N/A	0	0	0	0	0	0
2004	0	0	N/A	0	N/A	0	0	0	0	0	0

OV 1

Total Day & Night

	Flying	Class A		Class A-C		Class B	Class C	Fatalities			Destroyed
FY	Hours	Number	Rate	Number	Rate	Number	Number	Army Military	DOD Civ	Non DOD	Aircraft
1993	12538	0	0	1	7.98	0	1	0	0	0	0
1994	9882	0	0	0	0	0	0	0	0	0	0
1995	6948	1	14.39	2	28.79	1	0	0	0	0	1
1996	4425	0	0	1	22.6	0	1	0	0	0	0
1997	0	0	N/A	0	N/A	0	0	0	0	0	0
1998	0	0	N/A	0	N/A	0	0	0	0	0	0
1999	0	0	N/A	0	N/A	0	0	0	0	0	0
2000	0	0	N/A	0	N/A	0	0	0	0	0	0
2001	0	0	N/A	0	N/A	0	0	0	0	0	0
2002	0	0	N/A	0	N/A	0	0	0	0	0	0
2003	0	0	N/A	0	N/A	0	0	0	0	0	0
2004	0	0	N/A	0	N/A	0	0	0	0	0	0

Question 3: Analysis of causes in total and by aircraft Class A mishap rates for the past 10 years?

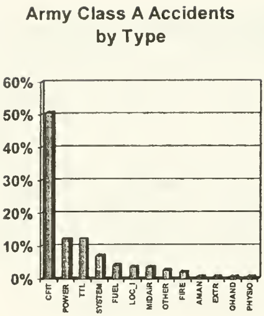
Answer:

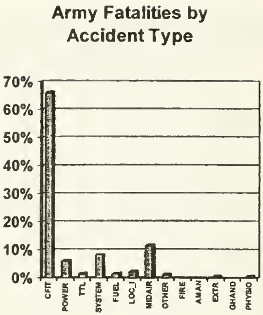
In total, just over 50% (99) of the Army's 196 aviation Class A accidents were a result of Controlled Flight Into Terrain (CFIT). The next biggest causes are powerplant failures and incidents during Taxi, Takeoff, & Landing, both (TT&L) at 12.2% (24 accidents each). Other system failures (non-powerplant related) account for 7.1% (14) of the Class A accidents. Environmental conditions contributed to 19% (38) of the accidents.

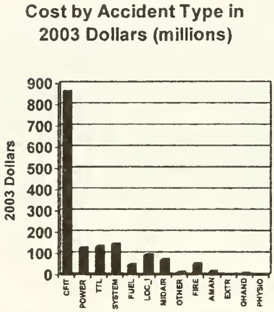
Looking at the various types of aircraft, AH-64s have the largest number of Class A accidents over the period (50). Of those, 32 (64%) were a result of CFIT and 6 (10%) were a result of systems failures (non-powerplant). There have been 40 Class A accidents involving U/MH-60s over the period; 22 (55%) of which were a result of CFIT, 6 (15%) were powerplant failures, and 5 (12.5%)were TT&L.

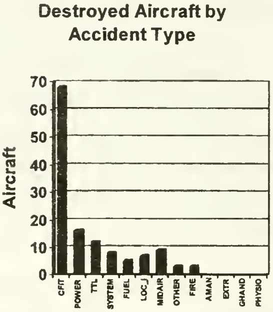
Similar trends hold for the other types of aircraft with the exception of C/MH-47s. There have been a total of 22 Class A accidents involving C/MH-47s. Of those 6 (27%) were CFIT , 4 (18%) were TT&L, and 3 (14%) were power related.

When looking at fatalities, CFIT accounts for 66% of the 180 fatalities over the period. While only 3.6% of the accidents, Mid-Air collisions account for almost 12% of the fatalities. Systems failures and powerplant accounted for 8.3% and 6.1% of the fatalities over the period, respectively.


Army Class A Accidents by Type


Army Fatalities by Accident Type


Cost by Accident Type in 2003 Dollars (millions)


Destroyed Aircraft by Accident Type

		FY													
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	total	Percent
AH64	CFIT	3	2	2	2	2	2	2	1	0	7	8	1	32	64.0%
	FIRE	0	1	0	0	0	1	0	0	0	1	0	0	3	6.0%
	FUEL	0	0	0	0	1	0	0	0	0	1	0	0	2	4.0%
	LOC I	0	0	0	1	0	0	1	0	0	0	0	0	2	4.0%
	POWER	0	0	0	1	0	0	2	0	0	0	0	0	3	6.0%
	SYSTEM	0	1	0	0	0	0	1	0	0	0	0	3	5	10.0%
	TTL	2	0	0	0	0	0	0	0	0	0	1	0	3	6.0%
	total	5	4	2	4	3	3	6	1	0	9	9	4	50	100%
UH60	CFIT	1	1	1	0	1	3	1	1	1	3	7	0	20	60.6%
	FUEL	0	1	0	0	0	0	0	0	0	0	0	0	1	3.0%
	GHAND	0	0	0	0	0	1	0	0	0	0	0	0	1	3.0%
	MIDAIR	0	0	0	1	0	0	0	0	1	0	1	0	3	9.1%
	POWER	0	0	1	1	0	1	0	0	0	0	0	0	3	9.1%
	SYSTEM	0	0	0	0	0	0	0	0	0	0	0	1	1	3.0%
	TTL	0	0	0	0	0	1	1	0	0	1	1	0	4	12.1%
	total	1	2	2	2	1	6	2	1	2	4	9	1	33	100%
MH60	CFIT	0	0	0	0	0	0	0	0	0	1	1	0	2	28.6%
	OTHER	0	0	0	1	0	0	0	0	0	0	0	0	1	14.3%
	POWER	0	1	0	0	1	0	1	0	0	0	0	0	3	42.9%
	TTL	0	0	0	0	0	0	0	0	0	0	1	0	1	14.3%
	total	0	1	0	1	1	0	1	0	0	1	2	0	7	100%
CH47D	AMAN	0	0	0	0	1	0	0	0	0	0	0	0	1	6.7%
	CFIT	0	1	0	0	0	0	0	0	0	3	1	0	5	33.3%
	LOC I	1	0	0	0	0	0	0	0	0	0	0	0	1	6.7%
	POWER	0	0	0	0	0	0	0	0	0	2	1	0	3	20.0%
	SYSTEM	0	0	1	0	0	0	0	0	0	0	0	0	1	6.7%
	TTL	0	1	0	0	0	0	1	0	0	1	1	0	4	26.7%
	total	1	2	1	0	1	0	1	0	0	6	3	0	16	100%
MH47	CFIT	0	0	0	0	0	0	0	0	0	1	0	0	1	14.3%
	EXTR	0	0	0	0	0	0	0	0	0	0	1	0	1	14.3%
	FIRE	0	0	0	0	0	0	0	0	0	0	1	0	1	14.3%
	FUEL	0	0	0	1	0	0	0	0	0	0	0	0	1	14.3%
	MIDAIR	0	0	0	0	0	0	0	0	0	0	1	0	1	14.3%
	OTHER	0	0	1	0	0	0	0	0	0	0	0	0	1	14.3%
	SYSTEM	0	0	0	1	0	0	0	0	0	0	0	0	1	14.3%
	total	0	0	1	2	0	0	0	0	0	1	3	0	7	100%
OH58D	CFIT	0	0	1	0	1	2	1	1	0	2	3	3	14	46.7%
	FUEL	1	0	0	0	0	0	0	0	0	0	0	0	1	3.3%
	MIDAIR	0	0	0	1	0	0	0	0	0	0	0	0	1	3.3%
	OTHER	0	0	0	0	0	0	0	0	1	0	0	0	1	3.3%
	POWER	0	0	1	0	0	1	0	0	1	1	0	0	4	13.3%
	SYSTEM	0	0	0	0	0	0	1	0	0	2	0	0	3	10.0%
	TTL	0	0	0	0	0	0	1	0	2	0	0	3	6	20.0%
	total	1	0	2	1	1	3	3	1	4	5	3	6	30	100%
OH58	CFIT	3	4	2	0	0	1	0	2	0	1	0	0	13	56.5%
	FUEL	0	2	0	0	0	0	0	0	0	0	0	0	2	8.7%
	LOC I	0	0	0	0	0	0	0	0	1	0	0	0	1	4.3%
	OTHER	0	1	0	0	0	0	0	0	0	0	0	0	1	4.3%
	POWER	1	0	0	0	1	0	0	0	0	0	0	0	2	8.7%
	SYSTEM	0	0	1	0	0	0	0	0	0	0	0	0	1	4.3%
	TTL	2	1	0	0	0	0	0	0	0	0	0	0	3	13.0%
	total	6	8	3	0	1	1	0	2	1	1	0	0	23	100%
H 6	CFIT	1	1	0	0	0	0	0	0	0	0	0	0	2	28.6%
	OTHER	0	0	0	0	0	0	0	0	1	0	0	0	1	14.3%
	PHYSIO	0	0	0	0	0	0	1	0	0	0	0	0	1	14.3%
	POWER	2	0	0	0	0	0	0	0	0	0	0	0	2	28.6%
	TTL	0	0	0	0	0	0	1	0	0	0	0	0	1	14.3%
	total	3	1	0	0	0	0	2	0	1	0	0	0	7	100%
AH 1	CFIT	0	1	0	0	0	0	0	0	0	0	0	0	1	33.3%
	POWER	0	0	0	1	0	0	0	0	0	0	0	0	1	33.3%
	TTL	0	0	0	0	0	1	0	0	0	0	0	0	1	33.3%
	total	0	1	0	1	0	1	0	0	0	0	0	0	3	100%
UH 1	CFIT	1	1	0	0	1	0	0	1	0	0	0	0	4	36.4%
	LOC I	1	0	0	0	0	0	0	0	0	0	0	0	1	9.1%
	MIDAIR	1	0	0	0	0	0	0	0	0	0	0	0	1	9.1%
	POWER	1	0	0	0	2	0	0	0	0	0	0	0	3	27.3%
	SYSTEM	1	0	0	0	0	0	1	0	0	0	0	0	2	18.2%
	TTL	0	1	0	0	0	0	0	0	0	0	0	0	1	9.1%
	total	5	1	0	0	3	0	1	1	0	0	0	0	11	100%
C 12	CFIT	1	0	0	0	0	0	0	0	1	0	1	0	3	60.0%
	LOC I	0	0	0	0	1	0	1	0	0	0	0	0	2	40.0%
	total	1	0	0	0	1	0	1	0	1	0	1	0	5	100%
OV 1	FUEL	0	0	1	0	0	0	0	0	0	0	0	0	1	100%
OTHERFIX	CFIT	0	0	0	0	0	0	1	0	1	0	0	0	2	66.7%
	MIDAIR	0	0	0	0	0	0	0	0	0	1	0	0	1	33.3%
	total	0	0	0	0	0	0	1	0	1	1	0	0	3	100%

Definitions

AVIATION MISHAP TYPES	CODE	DEFINITION	USED FOR	INCLUDES	EXCLUDES
ABRUPT MANEUVER	AMAN	Damage or injury caused by intentional abrupt maneuvering of the aircraft or UAV by the flight crew	Flight Flight-Related, Ground-Ops, UAV	Structural damage from aerodynamic overstress (e.g., over-g). Damage or injury when objects or people are thrown about by abrupt maneuvering.	All midair collisions (see MIDAIR). Collisions with ground (see CFIT). Hard landings, skids and runway excursions (see TT&L).
AERIAL REFUELING	ARFUEL	Any mishap that is a direct result of aerial refueling	Flight	Mishaps that occur as result of aerial re-fueling (broken baskets, fod'ed engines, airframe damage)	Mishaps which occur as a result of not being able to aerial refuel (e.g., pilot's inability to tank, tanker aircraft malfunctions, etc.) (see OTHER)
CABIN & CARGO SAFETY EVENTS	CAB/CAR	Miscellaneous occurrences in either the flight deck, passenger cabin or cargo compartment	Flight, Flight-Related, Ground-Ops	Mishaps when there are cargo or equipment leaks (e.g., fuel from aerospace ground equipment, over-serviced lavatories) or cargo shifts	Smoke & fumes from overheated or failed electrical components (see SYSTEM).
CONTROLLED FLIGHT INTO TERRAIN	CFIT	In-flight collision with terrain, water, trees or a man-made obstacle during flight prior to planned touchdown.	Flight, UAV	Mishaps involving impact with terrain, water, trees or man-made obstacles where the aircraft is controllable, and the pilot is actively controlling the aircraft or the pilot's ability to control the aircraft is reduced to due to spatial disorientation or GLOC. Mishaps where the aircraft is flown to a point where it is no longer possible to avoid unintended ground impact (e.g. low altitude overbank or flight into box canyon), regardless of subsequent pilot reaction (e.g. ejection, stall, spin, etc.)	Hard landings on prepared surfaces (e.g. overrun) near intended runway or LZ (see TT&L). Aircraft departures from controlled flight that ultimately result in ground impact, to include helo rotor droop (see LOC-I). Unavoidable ground impact due to system failure or malfunction (e.g., loss of thrust) (see SYSTEM or POWER).
ENVIRONMENT/WEATHER	ENV/WX	Encounters with weather or environmental phenomena	Flight Flight-Related, Ground-Ops, UAV	Weather (e.g. lightning, static discharge, thunderstorms, hail, freezing rain, ice accumulation, wind shear, turbulence, mountain waves and volcanic ash) and man-made environmental phenomena (e.g., wake turbulence and vortex encounters).	Carburetor and induction icing (see FUEL). Mishaps resulting from white-out or brown-out conditions (see CFIT, LOC-I and TT&L).
EXTERNAL OPERATIONS	EXT OPS	Mishaps involving personnel or equipment physically attached externally to the aircraft	Flight, Flight Related	Rappelling, fast-rope (specialized rapelling), stabo (stabilized extraction w/o lift), rescue hoist operations, and sling-loads.	Damage to aircraft caused by fuselage or wing stores (e.g., bombs missiles, ECCM pods) (see FIRE/EXP). Damage to aircraft caused by fuselage or wing external tanks (See SYSTEM).
FIRE/EXPLOSION	FIRE/EXP	Mishaps initiated by an external source of fire or explosion.	Flight, Flight Related, Ground-Ops, UAV	Mishaps resulting from an external fire (e.g., forest fire, grass fire, etc.) or explosion (e.g., unidentified weapons cache, rocket arming and exploding early, etc.).	Fire/Explosions initiated by aircraft system or powerplant failure (See SYSTEM or POWER) or where a fire/explosion is secondary to the principle cause
FRATRICIDE	FRAT	Mishaps where the employment of friendly actions, with the intent to kill or disable hostile forces or destroy their property, results in injury or death to friendly, neutral, or other noncombatant personnel or damage to their property	Flight, UAV		
FUEL-RELATED	FUEL	One or more powerplants experienced reduced or no power output due to a fuel anomaly	Flight, Ground-Ops, UAV	Fuel exhaustion, starvation, mismanagement, contamination, trapped fuel, the wrong fuel, carburetor or induction icing and the inadvertent placement of a throttle to cutoff.	
GROUND HANDLING & SERVICING OPERATIONS	GHAND	Mishaps resulting from improper ground handling or servicing or as the result of the failure of ground handling or servicing equipment.	Ground-Ops, UAV	Towing and cargo loading/unloading events. Ground servicing mishaps (e.g., jacking, craning, refueling, deicing, etc). Damage to other objects due to jet blast from stationary aircraft.	Damage to an aircraft (e.g., powerplants, systems) undergoing ground operational checks (see SYSTEM or POWER).
LOSS OF CONTROL IN-FLIGHT	LOC-I	Failure to maintain control of the aircraft or UAV while in flight.	Flight, UAV	Mishaps from failure to control the aircraft during flight, when that loss of control is not primarily related to environment, weather or any system failure. Includes stalls, spins and loss of control due to rotor droop or loss of tail rotor effectiveness. For UAVs, includes "lost link" mishaps where the "lost link" is not attributable to a system failure or malfunction.	Control loss due to a system or component failure (see SYSTEM and POWER). Control loss due to environment/weather (see ENV/WX).
MIDAIR COLLISION	MIDAIR	Collision between aircraft or UAV when intent for flight exists	Flight, UAV	Mishaps resulting from collision between two or more aircraft when intent for flight exists. Includes inadvertent contact during formation takeoffs and air-refueling operations.	
IMPACT DAMAGE – OBJECT	ODAM	Resultant damage to aircraft or powerplant due to impact with a foreign object or debris from another failed aircraft component	Flight, Ground-Ops, UAV	Mishaps where aircraft damage is due to impact with a foreign object or debris from another failed aircraft component (e.g., shards of aircraft tires). Mishaps where powerplant damage is due to an ingested object (e.g., ice, support equipment, hand tool, runway and taxiway debris, fasteners, aircraft panels, shards from failed aircraft tires, etc.).	Damage from wildlife strikes (see BASH). Powerplant damage due to the failure of internal powerplant components (see POWER)
IMPACT DAMAGE – WILDLIFE	BASH	Collision with a bird or other animal.	Flight, Ground-Ops, UAV		
PHYSIOLOGICAL	PHYSIO	Injury, illness or abnormal symptoms experienced by aircrew or others as a result of the dynamic flight environment.	Flight-Related	Spatial disorientation and GLOC events that do not result in CFIT or MIDAIR.	Spatial disorientation and GLOC events that result in CFIT or MIDAIR (see CFIT or MIDAIR).
POWERPLANT FAILURE OR MALFUNCTION	POWER	Failure or malfunction of an aircraft or UAV thrust-producing system or related components.	Flight, Ground-Ops, UAV	Mishaps resulting from failure or malfunction of an aircraft thrust-producing system or related component (e.g., fuel controls, engine-mounted gearboxes, propellers, thrust reversers, thrust vectoring components). Includes maintenance and crew induced failures.	Damage due to ingestion of foreign objects and debris (see ODAM). Damage from wildlife strikes (see BASH). Damage to gearboxes that are not engine mounted (see SYSTEM).
SHIP RELATED	SHIP	Any mishap that is a direct result of operating in the ship environment.	Flight, Flight-Related, Ground-Ops	Mishaps which are a direct result of operating onboard an aircraft carrier (i.e. ramp strikes, parted wires, catapult failures, flight deck crunches/accidents, etc).	Any flight which does not directly physically involve the aircraft carrier environment, such as flights originating from the carrier but not in direct contact with the carrier
SYSTEM FAILURE OR MALFUNCTION (NON-POWERPLANT)	SYSTEM	Failure or malfunction of an aircraft or UAV system or component - other than the powerplant.	Flight, Ground-Ops, UAV	Mishaps resulting from failure of aircraft structure, system or component - other than the powerplant. Includes maintenance and crew induced failures.	Damage from wildlife strikes (see BASH). Excludes failures of low dollar value components (e.g., fasteners, panels, tires, etc.) that result in significant damage to aircraft or powerplants (see ODAM).
TAXI, TAKEOFF & LANDING	TT&L	Operational mishaps occurring during takeoff, landing or other powered aircraft or UAV movement on prepared airfield surfaces, austere fields and helicopter landing zones.	Flight, Ground-Ops, UAV	Collisions with aircraft, flightline vehicles or equipment, or stationary objects (e.g. light poles) while moving on the ground or in hover taxi. Wing, tail or nacelle scrapes. Skids, hydroplaning, departures from prepared surfaces, and runway excursions, excessive drift on ground contact. Abnormal landings (e.g., hard, short, hot, long, heavy, or off-surface), accidental gear-up landings. Rejected takeoff and hot brake mishaps. Mishaps involving system failures when crew response was both improper/inadequate and well below reasonable expectations.	Towing mishaps (see GHAND). Gear-up landings, runway excursions or other mishaps when primarily caused by system or powerplant failures (see SYSTEM and POWER). Collisions with birds or animals (see BASH). Aircraft touchdown prior to available runway undercrun (see CFIT)
OTHER	OTHER	Any occurrence not covered under another category	Flight, Flight-Related, Ground-Ops, UAV	Used when insufficient information exists to categorize the occurrence (unknown and undetermined). Also used for mishaps that occur infrequently such as runway incursions and aerodrome issues (e.g., design, services and functionality).	

Question 4: Initiatives that services took to address aviation safety over the past 10 years, including those initiatives on aging aircraft, and success or failure of those initiatives.

Answer:

The Army Safety Strategic Plan

The Secretary of Army and Chief of Staff, Army, approved the Army Safety Strategic Plan in November 2001. This plan includes a requirement to "develop and resource an investment strategy for aviation accident prevention." The Army Safety Strategic Plan establishes risk management and safety objectives linked to Army Transformation. The endorsement from the Chief of Staff, Army, and Secretary of the Army requires major Army command commanders and Headquarters, Department of the Army action proponents to develop supporting operational plans and investment strategies. The Safety Strategic Plan reinforces the Army's vision that risk management and safety are commander's business, nested into planning and programming. Following that vision, the investment strategy is a risk-based resource decision across all funding accounts. Proponents will identify, prioritize, and document requirements using existing planning and program building processes, focused through risk-based systems analysis and performance metrics.

Army Safety Campaign Plan

The Army Safety Campaign Plan is under development by the U.S. Army Safety Center and will be published in the third quarter of fiscal year 2004, The Plan includes the collective input of a several organizations and agencies throughout the Army and represents the necessary and logical extension of the Army Safety Strategic Planning Process, which began with publication of the

Army Safety Strategic Plan in November 2001. The Army Safety Campaign Plan will provide implementing guidance to Headquarters, Department of the Army and the Major Army Commands. Its goal is to set the conditions for achieving irreversible momentum in making safety concerns and criteria an integral component of Army Transformation." The Secretary of the Army received the briefing on the Army Safety Campaign Plan on 22 January 2004. The Plan was well received and guidance provided to present the briefing to senior leaders across the Army.

Army Safety Coordinating Panel

Army senior leadership established the Department of the Army Safety Coordinating Panel to assist in the process of risk management integration into the business practices of the Department and synchronize investments across the Program Objective Memorandum, the. The Army Safety Coordinating Panel exists to oversee and synchronize Army safety strategic planning and safety and risk-management integration into the Army's current and future forces and provide updates and recommended safety courses of action to the Secretary of the Army and Chief of Staff, Army. The Army Safety Coordinating Panel is chaired by the Director of the Army Staff and vice-chaired by the Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health). Composition of the Army Safety Coordinating Panel includes principal members from 20 Department of the Army and major command organizations. Key members of the ASCP are the integrating agents: United States Forces Command, U.S. Training and Doctrine Command, U.S. Army Materiel Command, and Installation Management Agency. The integrating agents are charged with the task of developing synchronized major command action plans to support implementation of the Army Safety Strategic Plan.

Defense Safety Oversight Council
Aviation Safety Improvements Task Force

The Defense Safety Oversight Council establishes the Aviation Safety Improvements Task Force. The purpose of the task force is to identify data-driven, benefit-focused safety programs designed to reduce aviation accidents across the Department of Defense. These programs will produce near- and mid-term safety benefits but will have continuing and significant long-term effects. The task force will approve all recommendations going forward to the Defense Safety Oversight Council for consideration and implementation in each Service. The task force Executive Committee will consist of both voting and non-voting advisory members (noted with *), including senior members of the following organizations: United States Air Force, United States Army, United States Coast Guard *, United States Marine Corps, United States Navy, Commercial Aviation Safety Team *, and other organizations as desired by the Task Force Chair. Some of the success-oriented activities of the task force include: 1. Review accident and incident data, and conduct additional hazard analyses as necessary, to identify significant historical and potential future drivers of aviation mishaps. 2. Identify and prioritize high-leverage, feasible mitigation strategies to support near-term, mid-term, and long-term improvements in aviation mishap rates. 3. Assess effectiveness and feasibility of emerging safety technologies in terms of aviation mishap prevention value. 4. Examine existing safety policies, programs, and methodologies and make recommendations for change to enable a consistent approach to mishap investigation, analysis, and prevention across the Department of Defense. 5. Review ongoing private sector and other governmental agency best practices and make recommendations for incorporation into Department of Defense policies or programs. 6. Review existing reports on aviation safety and address outstanding issues. The task force is working toward completion of its charter in 145 days of initial working meetings.

Aviation Integrated Priority Lists

The Commanding Generals of the U.S. Army Aviation Center and U.S. Army Aviation and Missile Command and the Program Executive Officer for Aviation (Aviation Principals) approve the Aviation Integrated Priority Lists each year. The purpose of the lists is for the Aviation Principals to establish the requirements priorities for input to the applicable fiscal year Program Objective Memorandum by Department of the Army Program Evaluation Group. The Aviation Integrated Priority Lists establish unified priorities, which serve as a management tool for resourcing decisions during the fiscal year Program Objective Memorandum development. The lists were established because of the proliferation of uncoordinated "priority lists' by different organizations—combat developers, materiel developers, policy makers–throughout the aviation community. The success of the Aviation Integrated Priority Lists each year can be characterized by the ability to compile prioritized listings of unfunded or partially funded needs across the aviation Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities.

Aviation Safety Investment Strategy Team

The Army Safety Action Team established the Aviation Safety Investment Strategy Team in 1999 to achieve breakthrough gains in aviation safety. The ASAT initiative responded to increasing risks in aviation operations as well as to proposals from the Office of the Secretary of Defense to establish Department-level aviation safety goals. The strategy is to conduct a systems analysis of operational experience to document the hazards and risks in Army aviation and recommend the most productive controls to reduce those risks. The team is working to identify hazards and controls based on the analysis of actual aircraft accidents to enhance Army readiness through aviation safety improvements. The analysis team was chartered and guided by the Commanding Generals of the Aviation Center, the Aviation and Missile Command, the Program Executive Officer – Aviation and the Director of Army Safety, hereafter referred to as the

Aviation Principals. The Aviation Principals conclude that the team goals can be achieved but will require dedicated resource commitment and consistent follow up. Establishing measurable objectives and directing a plan to achieve them is an important step from the senior Army leadership toward making aviation safety a proactive, requirements-based program. The team and the associated activities of the Army Safety Coordinating Panel provide a sound basis for Army participation in the Department of Defense Safety Oversight Council. The Aviation Principals will program resources to continue to mature the team methodology; update and sustain the analysis; and integrate the analysis results and recommendations into the applicable materiel development documents. The success of the analysis effort continues to be the ability to identify hazards and controls based on the analysis of actual aircraft accidents that can be used to enhance Army readiness through aviation safety improvements.

Question 5: Future plans to address aviation safety, including those initiatives for aging aircraft.

Answer:

Aviation Safety Investment Strategy Team

As previously stated in question 4, Aviation Safety Investment Strategy Team (ASIST) is a tool for the aviation community to use accident history each year to identify hazards and produce acceptable control recommendations to influence an aviation safety investment strategy for the future. The success of this process initiated by the Commanding Generals of the Aviation Center, the Aviation and Missile Command, the Program Executive Officer – Aviation and the Director of Army Safety is that provides an aviation safety investment strategy, improve combat readiness, and provide a pool of subject matter experts on Army aviation hazards and associated controls. The results and recommendations from the annual ASIST analysis of accident reports can be readily applied to spiral acquisition strategy and to do fixes for the Soldier in the field.

Accident Reporting Automation System (ARAS)

The Accident Reporting Automation System (ARAS) will provide the Army with a fully automated accident reporting and investigation system. In January 2004, the initial stage of automated reporting for all Class C and D Army accidents was completed. In the near future, ARAS will allow automated reporting for all accidents. Previously, critical lessons learned from accidents required review and editing in a paper system. In contrast, ARAS allows access to critical safety information through a user friendly automated system. When fully operational the system will provide clear, concise, and useable risk management information. The ARAS will allow Army safety specialists and analysts to query the USASC database for accident trends, providing leaders the necessary tools to combat and mitigate hazards. As an added benefit, ARAS will more efficiently support the ongoing Aviation Safety Investment Strategy Team process.

Army Safety Management Information System (ASMIS)-1

ASMIS-1 is a web based automated risk assessment initiative that leverages known aviation hazard information and available technology to provide virtual experience to young aviation leaders. The ASMIS master database will assist leaders, at all levels, with the risk management process by providing hazard identification and control measures relevant to the operation they are conducting. The system is designed to query the ASMIS hazard database using a number of parameters ranging from mission to collective task, time of day, terrain, and equipment to provide the user with hazards and controls necessary to mitigate risk for their particular mission. The system features three web based modules—privately-owned vehicle, Ground, and Aviation. ASMIS-1 will provide all leaders with risk management tools and decision aids to assist mishap reduction and the safe accomplishment of all military operations. With the implementation of the ASMIS-1, leaders have the capability to design in risk mitigation factors as part of the mission planning process.

Flight School XXI

As more complex modernized aircraft were fielded across the Army, aviation leaders identified a decline in initial entry aviator proficiency as they arrived at their first units. The decline was largely a result of initial entry flight training being conducted in training aircraft not representative of the aircraft in the field. The U.S. Army Aviation Center developed and is in the process of implementing Flight School XXI to reverse this trend. The new Flight School XXI initiative shifts flight training from non-modernized aircraft to modernized aircraft and simulators. There are many benefits to this new approach to training. Aviator proficiency is increased since their initial training is conducted in their go-to-war aircraft. This greatly reduces the burden on units to train new aviators to individual proficiency and allows them to use their limited resources to train collective tasks. In addition, overall initial entry flight training is reduced approximately five weeks which gets aviators to the field sooner. A critical resource for the aviation commander is his instructor pilots. Instructor pilots assigned to Fort Rucker now instruct in their go-to-war aircraft as opposed to training students in aircraft not representative of the unit that they will be assigned. Upon reassignment to field units, these instructors will be more experienced and proficient in assigned aircraft.

Aviation Assessments

In partnership with the Directorate of Evaluation and Standardization (DES) of the U.S. Army Aviation Center, the Aviation Resource Management Survey team and Air Traffic Services Command both of US Army Forces Command, the U.S. Army Safety Center is developing a standardized process to identify those areas not already covered during each stand alone assessment visit under the current process. The partnership will result a tightly integrated assessment plan that eliminates seams or gaps that may currently mask or inadvertently overlook a safety risk.

Military Flight Operations Quality Assurance

The flight operations quality assurance program has been a successful and proven beneficial program in the commercial airline industry. The Joint Service Safety Chiefs endorsed the program on 28 August, 2000 and signed a memorandum of agreement to pursue funding for the implementation of a Military Flight Operations Quality Assurance Program (MFOQA). MFOQA brings to commanders and management personnel that tool necessary to expand those benefits to all areas of flight operation. The MFOQA concept is to provide commanders and management personnel with necessary information, extracted from flight data recorders, to improve flight operations in the areas of maintenance, training, safety, mission planning, after action reports, and operational readiness, thus improving the Army's war fighting capability. Current MFOQA pilot programs are being conducted at Fort Rucker AL, Fort Campbell KY, Korea, South Carolina Army National Guard, and Iraq.

Digital Source Collector

Over the past ten years the United States Army Safety Center has vigorously pursed the integration of Digital Source Collectors (DSC), commonly referred as flight data recorders, into Army aircraft. DSC may provide information otherwise not available to support accident investigations. Information may be available from an installed DSC that could contribute to the identification of facts associated with accidents. As a result, controls can be put in place to mitigate or minimize the probability of similar accidents in the future. The DSC is also the core element of the military flight operations quality assurance program.

Aircrew Coordination Training Enhancement (ACTE)

The U.S. Army Safety Center, in partnership with the U.S, Army Aviation Center, is in the process of fielding an enhanced aircrew coordination training program. Causal factors in 66.7% of Class A accidents (accidents involving fatalities or damages in excess of $1M) identify a lack of effective aircrew coordination. The new ACTE program provides updateable and relevant crewmember training that is designed to dramatically increase crew coordination understanding and therefore reduce the probability of aircrew coordination shortcomings. The training is built on three distinct pillars; assessment and evaluation, problem solving exercises and scenarios, and training standardization and delivery. ACTE products include interactive multimedia courseware with supporting training materials such as unit adaptable aircraft scenarios, user guides, instructor guides, and courseware management guides. ACTE will use the most up-to-date techniques and courseware to bring aircrew coordination training to the graduate level of understanding in all aircrews.

Tactile Situational Awareness System

The Tactile Situational Awareness System (TSAS) will use tactile sensors to provide information via sense/feel to enhance spatial awareness in rotary-wing aircraft. TSAS applies to an urgent need in Operation Enduring Freedom and Operation Iraqi Freedom. TSAS uses the sense of touch to provide spatial orientation and situational awareness information to aircrew members. TSAS information is especially useful to aircrews during terrain flight, take-offs and landings in conditions of reduced visibility, i.e. blowing sand and dust. The system has selectable functions to allow for different sensitivity settings and different approach options. Future applications include targeting and acquisition.

In summary, like our Nation, the Army and Army Aviation with it has been challenged within the last three years to a level and intensity which has not been experienced since even before Desert Shield and Desert Storm. While aviation accidents present a continuing challenge to the Army leadership, we have made significant progress in attacking and reducing the hazards and risks as they have been identified. The success of these efforts is clearly evidenced by the reduction in environmentally related accidents in the most inhospitable and challenging conditions found in our current combat theater.

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BY THE COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

STATEMENT OF

REAR ADMIRAL RICHARD E. BROOKS, UNITED STATES NAVY

COMMANDER, NAVAL SAFETY CENTER

BEFORE THE

HOUSE ARMED SERVICES COMMITTEE

ON THE

DEPARTMENT OF THE NAVY AVIATION SAFETY PROGRAM

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HOUSE OF REPRESENTATIVES

Mr. Chairman and distinguished members of the House Armed Services Committee, I am Rear Admiral Dick Brooks, Commander of the Naval Safety Center. Together with my Marine Corps colleague, Brigadier General Helland, I am here to present the current state of Naval aviation safety.

As we look to our past performance in aviation safety we have made significant reductions in our mishap rates over the past five decades. To put this in perspective, in 1954 naval aviation (this includes the Navy and Marine Corps) was averaging fifty-four mishaps per one hundred thousand hours; as of the end of FY 03 the rate was 2.42. Truly a dramatic decline but it also represents historical performance. There is a common theme however between what we accomplished many years ago and what we are working to achieve today. Our aviation efforts then, as today, were and are designed to save lives, our most precious asset, preserve resources in the form of the valuable equipment entrusted to our men and women, and enhance our combat readiness.

TREND ANALYSIS

By defining aviation mishap rates as those number of mishaps per one-hundred thousand flight hours, I believe it is important to focus on historical trends over time rather than individual years in isolation. Such a trend analysis provides tangible evidence of the existence of a viable aviation safety program. A safety program that always faces challenges due to the high-risk nature of flight operations, but has also shown many successes.

It is equally important to conduct an analysis of mishap characteristics in order to provide a focus for those areas required for correction and intervention. While today we are at an all-time low for mishap rates, we are not content with historical successes and are continually working to reduce mishaps even further. To accomplish this, the first step is a review and analysis of the causes of our mishaps. As we look back over the past five years, 83 percent of our class A flight mishaps were due to human error (either aircrew, maintenance personnel or supervisory). In addition, 36 percent involved some form of material failure. (Since mishaps generally involve multiple factors these percentages add up to more than 100 percent.) Once we analyzed the causes of our mishaps, we worked to identify those areas that would have the largest impact on reducing our number of mishaps. These include leadership, training and education, resources, and technology (both what is available today and emerging in the future).

MISHAP DATA COMPARISON

Before I discuss some of our accomplishments and programs in these areas, let me first provide an overview of how successful our safety programs have been. The following is what the Navy has saved in terms of Class A aviation flight mishaps and aviation fatalities, and the associated cost savings. There are many ways to compare these savings and I've chosen ten, five, and one year comparison periods. First a comparison of the ten-year period from FY94-03 to the period from FY84-93: During FY94-03 there would have been 106 additional class A flight mishaps, 132 additional fatalities and an additional $3B in cost had the mishap and fatality rates in FY94-03 showed no improvement over FY84-93.

Looking at a more recent five-year comparison for the same statistics, comparing FY99-03 to FY94-FY98 we "saved" 9 class A flight mishaps, 14 lives and $541M. Looking at the last two 12-month periods (3 Feb 2002 - 3 Feb 2003 vs. 3 Feb 2003 - 3 Feb 2004) the Navy had 6 fewer class A flight mishaps, 13 fewer fatalities, and a savings of $287M. These trends indicate our aviation safety program is effective and having a positive impact where it counts most – savings lives and preserving valuable equipment and resources.

LEADERSHIP, EDUCATION, AND TRAINING

In my opening remarks I mentioned leadership, education and training as key focus areas. In January 03, Commander, Naval Air Force, developed and instituted an Operational Risk Management (ORM) and Fundamentals Campaign designed to prevent and reduce aviation mishaps. Included in this campaign are the following steps: 1) Each aircraft type/model/series established a standing Operational Risk Management review board to conduct community-wide risk assessments, with a focus on human factors to address human error; 2) Each senior community type wing commander established a monthly publication/message from the senior community type wing to promulgate identified hazards and available risk controls, and to heighten safety and ORM awareness of community issues; 3) Type wing commanders review community-wide flight briefs and standard operating procedures on a routine basis, and revise them as necessary; 4) All deployable aviation squadrons complete a formal Naval Safety Center-sponsored cultural workshop during the at home period, with non-deployable units completing a workshop once every two years; and finally, 5) All aviation squadrons complete Command Safety Assessment (CSA) and Maintenance Climate Assessment surveys (MCAS) offered by the School of Aviation Safety in Monterey, Calif.

Having all squadrons measure their existing safety climate is one of the key drivers of the CNAF ORM Fundamentals Campaign. Both the CSA aircrew and MCAS maintainers' surveys are taken online, and offer commanding officers a web-based tool to provide direct feedback of the perceptions of safety within the organization. These tools were developed through research funding at the Navy and Marine Corps School of Aviation Safety at the Naval Postgraduate School in Monterey. To date more than 75,000 service members from more than 700 commands and organizations have participated in CSA and MCAS. Further in the area of education and training, the School of Aviation Safety annually educates approximately 700 Navy, Marine Corps, and Coast Guard officers. Educating our aviation leaders, coupled with safety research, are critical elements the school provides for proactively approaching mishap reduction.

In response to Secretary of Defense Rumsfeld's memorandum of 19 May, 2003, which challenged us to, "Reduce the number of mishaps and accidents rates by at least 50 percent in the next two years" we have taken additional steps. In September 2003 we established the Navy and Marine Corps Safety Council with an Aviation Safety Committee to address aviation specific areas and look for new and innovative ways to reduce mishaps. The Naval Safety Center and this committee developed an aggressive aviation mishap-reduction plan that is currently executing a

Plan-of-Action-and-Milestones (POAM) to achieve the 50 percent reduction goal. The plan emphasizes leadership, communication, and accountability: All critical factors for meeting mishap-reduction goals.

This plan's guiding precepts include an Operational Risk Management-based assessment of high-risk evolutions that result in questionable readiness and tactical returns, and eliminating any cultural mindset that mishaps are the cost of doing business. As MGEN Hess mentioned in his statement we are also fully engaged in the DSOC process and I serve as the Vice Chair of the Aviation Task Force.

Once again in the area of education and training, all Navy and Marine Corps squadrons are required to have safety surveys with periodicity determined by deployable status. A safety survey consists of a team of Naval Safety Center professionals who analyze a squadron/unit, scrutinizing operational, training, maintenance, and administrative procedures and identifying the unit's strong points as well as where they need improvement. Mandatory safety culture workshops also will be instituted with a frequency as that of squadron surveys. Culture workshops are comprised of a smaller team than a safety survey (usually two officers and one senior enlisted sailor). This team spends one and a half days immersed within a squadron's normal operational routine observing normal procedures, conducting spontaneous interviews, and holding three or four group discussions broken up by rank. As with the more in-depth safety survey the result is a written and verbal debrief to the CO of the strengths and weaknesses of the command as well as recommendations of how to address any potentially unsafe trends.

HUMAN FACTORS

As aircraft have become more reliable, humans have played a progressively more important causal role in aviation accidents. Consequently, the Naval Safety Center Aeromedical Division is working to address the highly complex issue of human error. In that regard, a Human Factors Analysis and Classification System (HFACS) has been developed and subsequently adopted for the Navy and Marine Corps as an accident investigation and analysis tool. The Aeromedical Division, Naval Safety Center, uses this as an analytical tool for our existing Aviation Mishap Database. By aligning human causal factors within the HFACS taxonomy, we can address trends in human performance as related to human error, possibly associated with perception, adverse mental or physiological states, or simply skill-based in nature. Taking the taxonomy out of the cockpit (looking at "other than aircrew causal factors"), we are able to analyze supervisory and/or organizational influences, which may have induced or influenced the mishap. This information will be used to analyze human performance and related causal factors to help understand--and ultimately reduce—mishaps.

AVIATION MAINTENANCE

In April 2003, The Naval Safety Center instituted an annual Aviation Maintenance Safety Conference to make sure maintenance initiatives and procedures are uniformly practiced throughout the Navy. These annual conferences provide a fleet-wide forum for promulgating and sharing aviation maintenance safety information. The goal is to improve readiness and mission effectiveness through increased awareness of mishap-reduction techniques, safety education, clarifying the Naval Aviation Maintenance Program (NAMP), ensuring compliance with SOPs and Navy Occupational, Safety and Health initiatives and regulations.

LEGACY AND AGING AIRCRAFT

We continuously embrace emerging technologies and innovative training for aviators and maintainers as we strive to meet the 50-percent mishap-reduction goal, and to get the most from our aircraft. To date, despite ages of many different Navy and Marine Corps aircraft, the statistics are a testimony to our many successes in safely maintaining and flying our legacy aircraft. Rigid inspection cycles—monthly, quarterly, annually, and required inspections based on engine hours—result in fully mission-capable and safe operation of our aircraft, despite their age.

It is often not aircraft age that necessarily intensifies aircraft maintenance, but shipboard operations—general exposure to the elements, and the stresses of arrested carrier landings and launches—which pose challenges to maintaining aircraft whether they are new in the inventory or are legacy platforms. However, our strict standards keep them safely flying, or on the ground if the situation warrants.

To specifically address the issue of aging aircraft Naval Air Systems command (NAVAIR) stood up an Aging Aircraft Integrated Process Team (AAIPT). The program's purpose is to develop effective solutions to combat the effects of aging aircraft on operational readiness. The scope of this effort includes analyses of failure modes and sustainment issues. It involves coordination with multiple competencies and program offices to focus on systems across the NAVAIR spectrum. The team is tasked with identifying aging problems, quantifying the costs/risks associated with each problem through application of cost tools, and providing information to NAVAIR Program teams for implementing effective solutions. The AAIPT also facilitates integration of other promising, developing technologies. Additionally, this AAIPT serves as a primary member on the Joint Council on Aging Aircraft, which was founded in September 2002. The council focuses on joint aging aircraft, product-oriented issues and process improvements, which capitalize on, and optimize, the effectiveness of the Agencies Aging Aircraft Effort through leveraging/sharing knowledge, joint projects/program and executive advocacy. Membership includes all uniformed services, along with the FAA and NASA. The products these teams deliver concentrate on monitoring and operating legacy aircraft to ensure that cost/risk benefits are balanced with safety and readiness.

TECHNOLOGY

Shifting to current and emerging technologies, some longer-term initiatives include studies of successful civilian programs and converting them to military use such as Military Flight Operations Quality Assurance, or MFOQA, which will assist our on-going programs for analyzing human error with digital flight and maintenance data capture-and-display for mishap prediction and intervention and scenario realization training. MFOQA is particularly noteworthy, as it has proven successful during recent flight demos with F/A-18 fixed wing, and SH-60 rotary, aircraft. MFOQA allows for rapid download and playback for animated Windows environment; it offers pilot debrief and maintenance control download information after every flight. Data is infinitely selectable with high fidelity animation and requires minimal aircraft hardware. It has a proven capability and was funded as a demonstration project for FY 2004 and 2005.

We are also continuing research for new programs and emerging technologies such as the Tactile Situation Awareness System (TSAS), which is a tactile vest with nodes that accurately make a pilot aware of aircraft movement and motion. We also are working on an emerging Operational Risk Management Assessment System (ORMAS), which is a conceptual risk-assessment tool that relies on existing data to determine the degree of risk a command faces in different situations, based on known risk factors. Still in its infancy, we believe it will eventually be capable of identifying training risks, using data analysis to look at mishap predictors and safety-related leading indicators (operational and personnel tempo, flight hour excesses or shortages, qualifications and their currency, cultural factors, maintenance and manning strengths or weaknesses, and training deficiencies).

One other technology I want to mention is our project to Web enable the current mishap-reporting and data-collection system in use at the Safety Center. Our current system is Naval Safety Center-centric, time-consuming, and labor-intensive. As a result, personnel at the Safety Center must input the majority of safety data, process data queries and conduct the analysis of our extensive mishap data. Our new web based system, the Web-Enabled Safety System (or WESS), will put the reporting system on the WEB for all authorized Navy, Marine Corps and DoD customers. Aviation commands will have the ability to directly input mishap data into WESS and use an extensive library of canned and ad hoc reports to query the system and develop effective and timely mishap avoidance strategies. This web-based system will truly streamline our safety business process and put timely and relevant information in the hands of those who need it most.

RESOURCES

As for resources and naval aviation's commitment to safety, the funding line for safety-related systems has also increased. Recognizing the need to maintain warfighting capability in concert with safe operation, the DoN has invested in safety-related improvements and activities to support our Naval Aviaiton. To complement a timely recapitalization program that encompasses more than $11B a year in procurement and associated

RDTEN, the Navy has provided more than $1.4B in FY05 to target specific improvements in the safety and reliability of our legacy fleet. In addition to safety investments in collision avoidance and ground proximity warning systems, other funded priorities include such programs as EA-6B Outer Wing Panel and Center Wing Section replacements, P-3 Special Structural Inspections, and Center Barrel Replacements for the F/A-18, as well as numerous communication/avionics and engine upgrades across a myriad of platforms. Total investment in this area is planned to exceed $6B over the FYDP.

CONCLUSION

Mr. Chairman, we believe naval aviation's overall safety programs and safe operating practices are a "natural consequence" of a winning organization that is dedicated to safe operations. Our trends indicate such, and our efforts continuously focus on prevention. Our safety culture does not accept loss of life or equipment, or maintaining the status quo, as a cost of doing business. Rather, we approach aviation safety with the belief that one mishap is too many and that all mishaps are avoidable. Initiatives like those I have described and our push to find and adapt other programs that will further reduce mishaps will ensure "Safety First, Mission Always" and maintain a naval aviation culture of safety through readiness. Thank you again for the opportunity to appear before you today.

NOT FOR PUBLICATION
UNTIL RELEASED BY
THE HOUSE ARMED
SERVICES COMMITTEE

STATEMENT OF

BRIGADIER GENERAL SAMUEL T. HELLAND

UNITED STATES MARINE CORPS

ASSISTANT DEPUTY COMMANDANT FOR AVIATION

BEFORE THE

HOUSE ARMED SERVICES COMMITTEE

CONCERNING

MILITARY AVIATION SAFETY

ON

FEBRUARY 11, 2004

NOT FOR PUBLICATION
UNTIL RELEASED BY
THE HOUSE ARMED
SERVICES COMMITTEE

Brigadier General
Samuel T. Helland
Assistant Deputy Commandant for Aviation

Brigadier General Helland is currently assigned as Assistant Deputy Commandant for Aviation, Headquarters, U.S. Marine Corps, Washington DC.

Brigadier General Helland earned a Bachelor of Science Degree from the University of Minnesota, Duluth and holds a Master of Science Degree from Troy State University. He is a graduate of the Marine Corps Command and Staff College and the National Defense University, Industrial College of the Armed Forces.

Brigadier General Helland began his military career by enlisting in the Army in 1968. He served three years with U.S. Army Special Forces, leaving after a combat tour of duty in Vietnam with the 5th Special Forces Group (ABN), Military Advisory Command (Special Observations Group).

Brigadier General Helland graduated from Marine Officer Candidate School in 1973, and was designated a Naval Aviator in 1974. He is qualified as a CH-53 pilot.

His Marine Corps career assignments include tours of duty with Amphibious Units, Aviation Combat Elements, and Joint Task Forces. During these tours of duty, he participated in exercises and contingency operations that ranged from the Arctic Circle, throughout the Mediterranean and Caribbean Seas, and finally to the Persian Gulf, where he saw combat during Operations Desert Shield and Desert Storm.

After graduating from the Marine Command and Staff College in 1987, Brigadier General Helland reported to Headquarters, Marine Corps to serve as a Staff Officer for the Department of Aviation, Aviation Programs and Weapons Division (APW).

In 1990, he left Headquarters and was assigned as the Logistics Officer for the Marine Aircraft Group 26, only to be sent to the Persian Gulf as the Operations Officer for Marine Heavy Helicopter Squadron 461, MAG 40.

After returning from Southwest Asia, Brigadier General Helland assumed command of HMH-461 in June 1991. He commanded HMH-461 until June 1993 after which he attended the Industrial College of the Armed Forces. After graduation, he reported to the Joint Staff and served as a member of the J-7, Operational Plans and Interoperability, Conventional War Plans Division, where he later served as Joint Staff Officer until 1996.

Brigadier General Helland assumed command of the 22nd Marine Expeditionary Unit (MEU) in August 1996 and led the MEU through two Mediterranean deployments. During this period the MEU conducted five successful real world contingency operations, including Joint Task Force Nobel Obelisk in Sierra Leone in May 1997, during which Brigadier General Helland was designated as Commander, Joint Task Force Noble Obelisk.

In April 1999, after returning form his second deployment, he was assigned as the Deputy Commander JTF-Shining Hope providing humanitarian assistance to Albanian Kosovo refugees in Albania and Macedonia.

Returning from Albania in July 1999, he was assigned to US Joint Forces Command, Norfolk VA, as the Director for Operations and Plans.

Leaving US Joint Forces Command in August 2001, he reported to US Marine Forces South, Miami Florida as teh Deputy Commanding General Marine Forces, South and the Commanding General Fleet Marine Forces South. Leaving in August 2003 for his current assignment to Headquarters, US Marine Corps.

Brigadier General Helland's personal decorations include the Bronze Star, Legion of Merit, Purple Heart, Meritorious Service Medal with gold star, Defense Superior Service Medal, Navy and Marine Corps Commendation Medal with gold star, Navy and Marine Corps Achievement Medal, Combat Action Ribbon with one star, and various service and unit awards.

Chairman Hunter, Mr. Skelton, distinguished Members of the Committee, thank you for this opportunity to appear before you to discuss Marine Corps Aviation Safety.

The Marine Corps deployed over 60% of its aviation assets in support of Operation Iraqi Freedom. We supported operations in Afghanistan with a squadron of AV-8Bs for over a year. As I speak, the Corps is preparing for another deployment into Iraq in support of OIF II. We continue to support operations in Afghanistan with Reserve AH-1W Cobra gunships and CH-53E heavy lift support aircraft. Such deployments, where combat is a reality, have again proven the importance of our maxim, "train like you will fight." Aircrews deploying to Iraq have participated in a major exercise known as Desert Talon, in Yuma, Arizona in order to prepare them for the challenges they will face in the CENTCOM theater of operations.

Safety remains a major focus for the Marine Corps leaders who have the responsibility to provide trained and ready aircrews to the Combatant Commanders. Well-trained tactical aircrew are absolutely essential for successful combat operations. We train to a rigorous and demanding set of mission essential tasks which translate into combat readiness. I sincerely believe we mitigate many of the dangers of combat training through a very effective Safety Program that is an integral part of our tactical training program. The Marine Corps acknowledges the hardships of combat, and at times, the loss of aircrew and aircraft during the preparatory combat training. We owe our Marines mission-ready aircraft and the best possible training programs.

This demanding training carries a price, at times, as unfortunately Marine aviation is not mishap free. However, the twenty-year overall trend shows a reduction in our serious flight mishap rate from 6 mishaps per 100,000 flight hours to approximately 2 mishaps per 100,000 flight hours. The mishap rate for the last ten years is also decreasing, but at a much slower rate, from 3.5 mishaps per 100,000 flight hours to 2.7 mishaps per 100,000 flight hours.

Class A mishap rates are based on all flight hours flown regardless of aircraft or mission. Most of our Marine Corps aircraft train and fight in the most demanding regimes- tactical, operational, and combat missions. Whether it is our helicopters or tactical jet aviation platforms, we employ them in the heart of operations that are both demanding and dangerous. We are actively working to ensure our helicopters have the required Aviation Survivability Equipment needed to address enemy threats in combat operations, whether in Iraq or Afghanistan. Unlike some of the other Services, we don't own a large fleet of transports or have a large training command. Thus, flight hours used to compute into our Mishap Rate are not diluted by the hours flown by transport aircraft that fly long, lower threat missions or by training aircraft that fly less dangerous missions. Consequently, the Marine Corps' Fighter/Attack and assault support mishap rates should be examined with these facts in mind.

The mishap rate for the Marine Corps in FY03 was 2.9. This rate represents a slight increase from the 10 year average, but it does not invalidate the significant progress in aviation safety sustained for the last ten years. While we do not know precisely what is causing the increase, the uncertainty of the Global War on Terrorism and the potential for extended military operations require increased safety awareness. This uncertainty, compounded by an increased desire to train harder to prepare for combat, may be an underlying factor in the recent mishaps. The operations in combat zones in Afghanistan, Iraq, and the Horn of Africa account for the vast majority of mishaps during the recent year. However, when viewed within the context of other combat events, this represents an improvement: the mishap rate in OPERATION DESERT SHIELD/DESERT STORM was 8.42, and the current mishap rate in OPERATION IRAQI FREEDOM is 5.96. This comparison represents 30% fewer combat mishaps.

I would like to briefly discuss the AV-8B Harrier. The problems highlighted in the LA Times' articles list four primary material problems related to AV-8B mishaps: Flaps Controller, Engine, Nose Wheel Steering, and Ejection System. Being aware of these challenges, we have taken corrective action. The legacy Flaps Controller was replaced with a new Digital Flaps Controller; and since its installation there have been no Flap related mishaps. The F-402 engine underwent an extensive Engine Life Management Plan (ELMP). After the ELMP was instituted in CY 2000, there have been no engine failure mishaps. The Nose Wheel Steering (NWS) system has been redesigned and incorporated into all Marine Corps Harriers. Since the redesign of the NWS system there have been no NWS related mishaps. The Ejection System in the AV-8B is currently being upgraded to address all ejection related mishaps including: four-line parachute release, Electronic Airspeed/Altitude Sensor, an upgraded helmet and visor, and Parachute Over-Inflation Controller. Since the upgrades were installed, there have been no ejection related deaths. After the AV-8B groundings in CY 2000, the Harrier once again proved to be an operationally effective aircraft. Additionally, mission readiness, pilot flight time, and fleet deployments have all increased. Pilot morale is high, as is their confidence in the aircraft. The aircraft has been performing superbly as shown by its most recent successes in Afghanistan, its role during Operation Iraqi Freedom, and its current deployment around the world.

The Marine Corps is taking the lead in reducing skill-based errors that account for the vast majority of mishaps by implementing Crew Resource Management and Military Flight Operations Quality Assurance programs. These programs focus on leadership, training, and readiness. At the direction of Assistant Commandant of the Marine Corps and the Deputy Commandant for Aviation (DCAvn), the Marine Corps is re-examining, re-organizing, and re-vitalizing its Crew Resource Management (CRM) Program. This reorganization places the CRM program under the advocacy of DCAvn and increases emphasis on CRM throughout the Marine Corps. Additionally, skill based error and error management are the subject of a study commissioned by the Marine Corps and will be a major initiative for the Defense Oversight Safety Council Aviation Task Force, of which I am a member.

The Marine Corps has formed a close partnership with the Navy in the two-year test initiative, Military Flight Operations Quality Assurance (MFOQA). This initiative places flight data recorders in selected aircraft. For each flight, the data captured is digitized and made available for debriefing aircrew and maintenance personnel. MFOQA assists aircraft maintenance by identifying when flight or engine parameters have been exceeded by recording, identifying, or verifying maintenance discrepancies. It also provides the ability to reconstruct data for flight debrief or mishap analysis.

Aircraft platform upgrades incorporate significant aviation safety enhancements. Rotary wing and fixed wing platforms continue to incorporate material enhancements to improve operational capability, readiness, and safety. These Operational Safety Improvement Programs (OSIPs) range from the Dynamic Component Upgrade (DCU) and Safety Improvement Program (SIP) on the CH-46E to the software upgrades on the F/A-18's.

The focus of our efforts at Headquarters Marine Corps Aviation is to ensure that our aging legacy platforms are replaced on a timely basis and that we have a transition plan that will allow us to introduce new systems designed to operate with greater safety. From the period of 2006 to 2015, we will introduce the KC-130J, MV-22, AH-1Z, UH-1Y, and JSF (STOVL) into our Fleet Marine Forces. With these systems come new simulators. Those simulators will allow our aircrews the luxury of training in the most demanding scenarios without incurring the risks associated with flying actual aircraft. The superior ability of these new simulators to replicate actual flight characteristics will allow us to produce better trained aircrew. We also expect to reap savings by conducting more of our training in simulators and reserving the real flying for those missions where flight in real time and real world conditions is essential. Can all of our flying be replaced with simulation? No, and it should not be, but we expect to replace a large percentage of our initial and proficiency training with first class simulator training. We strongly believe that not only will this produce a better trained force, but it will result in more efficient combat training.

Our commitment to reducing aviation mishaps remains stronger than ever. The Marine Corps' partnership with other services in the Defense Safety Oversight Council and the Aviation Safety Committee of the Navy/ Marine Corps Safety Council, as well as service-specific programs and platform safety enhancements demonstrate our continued pursuit of reductions in mishap rates. The success of our missions and the protection of our most precious assets demand nothing less.

Mr. Chairman, thank you again for the opportunity to share with the committee the challenges and successes of Marine Corps aviation safety.

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HOUSE ARMED SERVICES COMMITTEE

STATEMENT OF

CHRISTOPHER BOLKCOM

SPECIALIST IN NATIONAL DEFENCE

CONGRESSIONAL RESEARCH SERVICE

BEFORE THE

HOUSE ARMED SERVICES COMMITTEE

HEARING ON MILITARY AVIATION SAFETY

FEBRUARY 11, 2004

NOT FOR PUBLICATION
UNTIL RELEASED BY
HOUSE ARMED SERVICES COMMITTEE

Mr. Chairman, distinguished members of the committee, thank you for inviting me to speak to you today about military aviation safety.

Military aviation safety is a concern, because aviation accidents (also known as mishaps) erode DoD's war fighting capabilities in many tangible and intangible ways. Accidents degrade operational readiness. They cost lives and hurt morale. They reduce the number of aircraft readily available, both because of damage and aircraft destruction, and also because aircraft are often grounded while accidents are investigated. Accidents consume financial resources. Damaged aircraft must be repaired, and destroyed aircraft replaced. Accident investigators must be trained, and investigations funded. Accidents are hard on personnel. According to DoD records, 3,072 people died in military aviation accidents between 1980 and 2003.[1]

As you requested, this testimony will address four questions:

- What is DoD's recent military aviation safety record?
- Is this record acceptable?
- What are the leading factors that contribute to military aviation mishaps?
- What initiatives might be pursued to improve military aviation safety?

DoD's recent military aviation safety record

Assessing accident data over time can be useful when trying to make observations on whether safety is improving, worsening, or holding steady. Making observations on aviation safety trends depends on perspective. Making observations is complicated by wide variations in accident rates over time, and by the fact that the military Services do not record accident data in a coordinated and uniform manner.

From one perspective, it can appear that military aviation accidents are becoming less frequent, suggesting that military aviation is becoming safer. Over the last 50 years, according to DoD data, the frequency aviation accidents has dropped markedly. In 1955, for example, DoD suffered over 2,200 Class A aviation mishaps. A mishap is categorized as Class A if the total cost of damages to Government and other property is $1 million or more, a DoD aircraft is destroyed, or an injury and/or occupational illness results in a fatality or permanent total disability. By 1999, this number had dropped to 70. Perhaps more significantly, the annual number of mishaps per 100,000 flight hours has similarly dropped over this time period.[2] In 1975, the Class A mishap rate was over 4 per 100,000 flight hours. In 1993 that rate had been cut in half.[3] In 1954, the Navy lost 776 aircraft to mishaps. By 2001, the number had dropped to 15 aircraft.[4] During this time period, DoD has implemented a variety of measures that it says have contributed to lowering mishap rates. The Navy, for example, began fielding aircraft carriers with angled decks. All the Services initiated safety programs, and opened safety centers during this time period.

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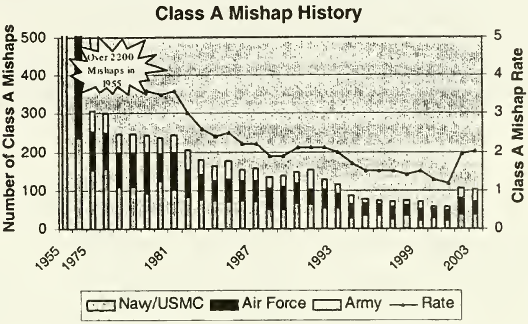
[1] Data provided by Service Safety Centers: 613 fatalities for the Army, 1,193 fatalities for the Air Force, and 1,266 fatalities for the Navy and Marine Corps.

[2] In 1954, DoD operated many more aircraft than it does today. Therefore, comparing 2,200 mishaps in 1955 to 70 in 1999 is not an "apples-to-apples" comparison. Dividing the number of mishaps by 100,000 flight hours makes the comparison of two different sized forces valid. The dotted line in Figure 1 indicates this "mishap rate" over time.

[3] See Appendix II.

Figure 1. Number and Rate of Class A Mishaps, 1955-2003



Source: Institute for Defense Analyses chart, prepared for Assistant Deputy Undersecretary of Defense (Safety & Occupational Health). Updated by CRS.

From another perspective, however, it appears that while accidents may be less frequent than in the past, recent improvements in aviation safety may have slowed, and the frequency of accidents has not appreciably declined lately. The Defense Science Board noted that "the previously declining DoD accident rate (1950 to 1994) has now reached a plateau."[5] A review of DoD mishaps indicates that between 1995 and 2001, aviation mishap rates remained relatively constant, at or near 1.5 per 100,000 flight hours.

In any given time span, the number of accidents can vary considerably, suggesting that improvements in safety may not be inevitable nor permanent. The time period 1997 to 2003 is a good example of the apparent variability in aviation accidents. On September 17, 1997, Secretary of Defense William Perry directed that all four military Services conduct a mandatory 24 hour cessation of aviation training missions. Concerned about a large number of aircraft mishaps, Perry urged commanders to "thoroughly examine our training missions, ensuring that our crews are appropriately tasked and that missions are conducted as safely as possible."[6] Just three years later, in FY2000, DoD reported that it experienced its safest aviation year up to that time, with only 1.23 accidents per 100,000 flight hours.[7] Mishap rates in FY2001 were even lower. By February 2002, however, safety (in the Air Force) had again become cause for concern. Because "The Air Force has had twice as many aircraft crashes this year as it had at the same time in 2000 and 2001," Air Force Chief of Staff General John Jumper took the unusual step of ordering every unit worldwide to stop operations for a day to focus on safety.[8] The commander of the Air Force's Air Combat Command repeated the "day off" tactic on December 6, 2002 because mishaps continued to accumulate.[9] The combined DoD Class A mishap rate for 2002 was 1.95, the highest rate in ten years (2.07 in 1992). FY2003 continued this negative trend, with a combined Class A mishap rate of 2.03.

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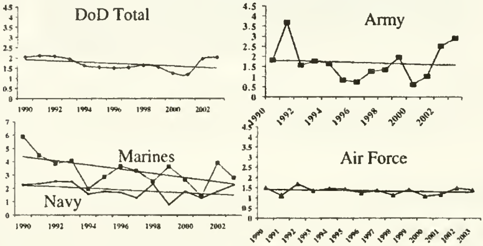
[4] Captain Kurt Garbow. Deputy Special Assistant for Safety Matters. OPNAV N09FB. "Naval Aviation Safety Briefing." February 28, 2002.

[5] Report of the Defense Science Board Task Force on Aviation Safety. February 1997. Office of the Undersecretary of Defense for Acquisition and Technology. Washington, D.C. February 27, 1997.

The Services' aviation safety records contrast sharply. Over this time period, the Air Force has consistently experienced the lowest rate of mishaps. The other Services tend to have higher incidences of mishaps and greater variability in the number and rate of mishaps from year to year.

Figure 2. Class A Aircraft Mishap Rate
(Includes OEF and OIF)



Source: U.S. Military Accident Statistics as of November 4, 2003. Deputy Undersecretary of Defense for Installations and Environment (DUSD(I&E))

The contrast between the Services extends back to at least 1980. Between 1980 and 2003, the Air Force experienced the greatest number of Class A mishaps. Due to its very large number of flying hours (between 2 and 3.5 million hours annually) these mishaps translated into the lowest Class A mishap rate among the Services, with 1.6 per 100,000 flying hours. The Marine Corps experienced the fewest number of mishaps, but because it flies comparatively less, (between 260,000 and 460,000 hours annually) it showed the highest Class A mishap rate, with 4.55 per 100,000 flight hours, almost three times the Air Force rate.

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[6] Memorandum for Secretary of the Army, Secretary of the Navy, Secretary of the Air Force. September 17, 1997. The Secretary of Defense. Washington, D.C.

[7] "Citing Mishap Rates, DoD Calls FY-00 the Safest Aviation Year Ever." *Inside the Air Force.* October 6, 2000.

[8] John Diedrich. "Air Force Ordered to Think Safety." *Colorado Springs Gazette.* February 8, 2002.

[9] "Ari Force Pilots Will Take a Day Off." *Los Angeles Times.* December 6, 2002.

Table 1. DoD Aviation Class A Mishaps 1980-2003[10]

	Total #	Mishap Rate (#/100,000 flight hours)
Air Force	1,010	1.46
Army	603	1.8
Navy	821	2.33
Marine Corps	369	4.07
DoD	2,803	2.41

Is this record acceptable?

There is no consensus among analysts nor policy makers on the state of military aviation safety. Many argue that the current mishaps rate is acceptable. They point out that: (1) military aviation operates under very trying circumstances, (2) DoD appears to make safety a high priority, (3) mishap rates have steadily declined over the last 50 years, and (4) contemporary mishap rates have been very low by historical standards. Others disagree, saying that the contemporary mishap rate of 1.7 Class A mishaps per 100,000 flight hours (1990-2003 average) is too high.

Some observers say that DoD should strive toward a goal of zero aviation mishaps. Proponents of this perspective argue that there is no "acceptable" accident rate and a single accident or fatality is too high. People die in accidents often needlessly, zero-mishap proponents say, and by focusing on rates and statistics, policy makers lose sight of this. They point out that although DoD's Class A mishap rate steadily improved between 1990 and 1996, 777 people died and $9.42 billion in equipment was destroyed in aviation accidents in that time period.[11] The fact that the aviation mishap rate was the lowest ever in FY2000, was little consolation to families who lost loved ones in accidents, zero-accident proponents say. The corrosive effects of aviation accidents on military readiness are well documented. By tolerating even one aviation accident, we unnecessarily hamstring the military, which is already facing serious challenges on the battlefield, they argue. Some DoD and Air Force officials have expressed support for a goal of zero mishaps.[12]

Others argue that while mishaps and especially mishap fatalities are unfortunate and to be avoided, some number of accidents is inevitable. Those who believe that low mishap rates are tolerable, point out that not even commercial airlines have achieved a zero mishap rate, despite considerably more benign flight conditions. Training for and conducting military operations assumes some inherent risk. Low mishap rate proponents argue that the risk of accidents should be minimized, but will remain nonetheless. While striving for zero mishaps may be a worthy goal, they believe it is unlikely to be achieved; accordingly, aviation safety can and should be improved by striving toward an ambitious, yet achievable goal. Some low mishap rate advocates point toward the commercial aviation major mishap rate of .033 per 100,000 flight hours as one benchmark.

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[10] Source: Safety Centers.

[11] Report of the Defense Science Board Task Force on Aviation Safety. February 1997. Office of the Undersecretary of Defense for Acquisition and Technology. Washington, D.C. February 27, 1997. p.ES-2.

[12] DoD spokesman Kevin Bacon in "Citing Mishap Rates, DoD Calls FY00 the Safest Aviation year Ever." *Inside the Air Force.* October 6, 2000. And Maj. Gen. Kenneth Hess, in "A Plague of Accidents." *Air Force.* February 2004.

Leading factors that contribute to military aviation mishaps

Assessing the cause of mishaps is central to preventing them, or reducing their likelihood in the future. Many factors can contribute to aviation mishaps. Human error, mechanical failure, weather, and maintenance problems are some of the factors that can by themselves, or in conjunction, cause an aviation mishap. Often, singling out "the" cause of a given accident is difficult. Observers tend to argue that high operations tempo (OPTEMPO), aircraft age, and human error have strongest correlations with increased mishaps.

OPTEMPO. Many observers warn that simultaneous operational conflicts, and reduced manpower and equipment may speed up OPTEMPO to a degree that safety is compromised. Some fear that due to the demands of the war on terrorism less experienced people may be "back-filling" critical jobs, the military may be taking more chances, and an intensified training pace may result in increased aviation mishaps. For example, "Anytime you have an increase in the training cycle or in support of combat operations, it raises the probability that more accidents will occur," according to one observer.[13] Others argue that deploying overseas and fighting wars are what the military is designed to do, and that high OPTEMPO is "business as usual." Thus, mishap rates should not, and do not, increase during war, they argue.

According to a 1996 GAO report, "while service studies have addressed the relationship of operating tempo to aviation mishaps, direct correlation has been inconclusive."[14] The GAO points out that "the relatively low incidence of Class A flight mishaps make drawing inferences and statistical correlations of variables with mishap rates difficult."[15] In this report, the GAO described two seemingly contradictory Air Force studies, one that found that there was not a cause and effect relationship between OPTEMPO and aviation mishaps, and another that found that high OPTEMPO posed an "obvious operational safety risk."

Office of the Secretary of Defense (OSD) records also suggest a tenuous relationship between OPTEMPO and aviation mishaps. As the chart below shows, aviation mishap rates have fluctuated during operational conflicts. Often, mishap rates have risen during conflicts, but they have decreased as well. Sometimes, as during Operation Joint Endeavor, mishap rates have been both relatively high and low.

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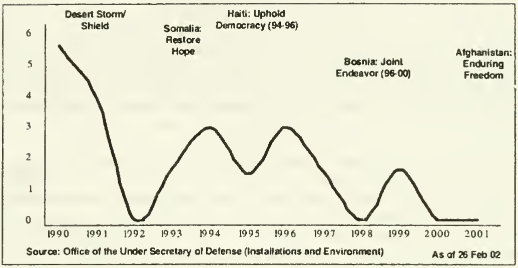
[13] Jane McHugh. "Shinseki" Cut Accidents." *Army Times*. September 2, 2002. p.8.

[14] "Military Aircraft Safety: Significant Improvements Since 1975." General Accounting Office. GAO/NSIAD-96-69BR. February 1996. P.27.

[15] *Ibid*

Figure 3. Class A Accident Rates and Recent Conflicts



Source: Office of the Under Secretary of Defense (Installations and Environment)

As of 26 Feb 02

Some observers say that an apparent rise in aviation mishaps during FY2002 and FY2003 is in part attributable to pressure caused by the global war on terrorism and the war in Iraq. "I think the system is straining under its previous burden. What we have is a previously strained and overburdened military system, and then we get ourselves into a war in Afghanistan" commented one safety expert.[16]

A spokesman for the Air Force Safety Center's aviation division reportedly claimed that higher accident rates were caused by the hazardous missions flown in Afghanistan and Iraq.[17] In mid-2002, the chief of Air Force safety commented, "None of the accidents we have investigated so far this year for which there is a completed investigation have come up and said that training or ops tempo or things like that are contributing factors."[18] In 2002, Marine Corps safety experts also downplayed the relationship operations and mishaps: "In deployments, we are doing a fantastic job. It's back here at home in training, where we are not so focused that we are having problems (with mishaps)"[19] Even prior to the war in Iraq, the effect of OPTEMPO on mishap rates was debated. A 2000 Army report on safety found "The sense of a higher risk tends to sharpen our awareness of the dangers, and we rise to meet the challenge."[20]

While no correlation between high OPTEMPO and increased mishaps has been proved, it also cannot be disregarded. A great degree of uncertainty remains.

Aircraft Age. Many observers argue that as aircraft age, they require more maintenance. More maintenance, in turn, presents increased opportunities for error and oversight. Also, it is argued, older parts and equipment are more likely to fail than newer equipment, causing aviation mishaps.

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[16] Russell Carollo. "31 Dead In Military Aviation Accidents Since Oct. 1." *Dayton Daily News.* March 3, 2002.

[17] Bruce Rolfsen. "Friendlier Skies." *Air Force Times.* October 27, 2003. p.10.

[18] Bruce Rolfsen. "22 Flight Deaths, and a Search for Answers." *Air Force Times.* August 26, 2002. p.10.

[19] Sandra Erwin. "Navy Aviation Mishaps Cost $4.3 Billion Over Five Years." *National Defense.* October 2002. p.40.

[20] "Army Aviation Safety Record Worsens." *Helicopter News.* January 14, 2000.

The average age of DoD aircraft is increasing. In the Air Force, for instance, some estimate that the average aircraft age in 2002 was 22 years, up from 13 years in 1990.[21] In 1999, the Congressional Budget Office (CBO) offered a more conservative estimate, "...the average age of Air Force aircraft...will exceed 15 years by 2002." But CBO cautioned that the average aircraft age will continue to increase into the next decade. "That average age will climb to a peak of almost 20 years in 2011 before starting to decline as Joint Strike Fighters become operational."[22]

Intuitively, this line of reasoning – that older aircraft are more prone to accidents – makes sense, and if true, one would expect aviation mishaps to increase as the age of the military's aircraft increased. However, mishap statistics and observations by military safety center officials bring into question a cause and effect relationship between aircraft age and mishaps. While the average age of Air Force aircraft, for example, increased from 1990 to 2000, mishap statistics indicate that Air Force accidents slowly decreased over this same time period.

It also appears that growing concern over Navy and Marine Corps accidents comes during a downward trend in material failures. Reportedly, over the last 10 years the number of material failures contributing to a mishap has been .86 per 100,000 flight hours. Over the past five years, that rate has decreased to .71 per 100,000 flight hours. Navy statistics indicate that between 1997 and 2001, material factors contributed to mishaps at a rate of .68 per 100,000 flying hours. [23]

The Class A mishap rates for FY2002 and FY2003 are higher than FY2001. Some believe that this increase in mishaps is due to aging aircraft. Many of the aircraft involved in Class A mishaps, reportedly, are among the younger aircraft of their type. A Marine Corps CH-53E helicopter crash that killed two Service members in Afghanistan was eight years old. An EA-6B *Prowler* that crashed into the Atlantic Ocean was 11 years old, and a Class A mishap in March 2002 involved a relatively young (13 years old) F-14 *Tomcat.*[24]

Human Factors. In many ways, humans are more complicated and more difficult to predict and control than are machines. Therefore, it may not be surprising that human error appears to be a dominant factor in aviation mishaps. The Defense Science Board – DoD's premiere body of scientific and technical advisors – found in 1997 that "Human performance is a causal factor in over 70% of all Class A mishaps."[25] As the following table suggests, human error (at least for the Navy and Marine Corps) may have had an even stronger influence on aviation mishaps in the time period 1997-2001.

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[21] Loren Thompson. "Aging Aircraft: Clinton Decay Continues Under Bush." Issue Brief. March 1, 2002. Lexington Institute.

[22] Statement of Christopher Jehn, Assistant Director National Security Division, Congressional Budget Office on Modernizing Tactical Aircraft. Before the Subcommittee on Airland of the Committee on Armed Services United States Senate. March 10, 1999.

[23] Tom Bowman. "Age of U.S. Aircraft Fleets Stirs Concern in Military." *Baltimore Sun.* April 15, 2002.

[24] *Ibid*

[25] Report of the Defense Science Board Task Force on Aviation Safety. February 1997. Office of the Undersecretary of Defense for Acquisition and Technology. Washington, D.C. February 27, 1997.

Table 2. USN/USMC Class A Mishap Causal Factors (FY97-01)[26]

Factor	# Events	Rate	%
Human Error	114	1.52	86
Supervisory	91	1.21	69
Aircrew	88	1.17	67
Material	51	.68	39
Maintenance	18	.24	14
Facilities	13	.17	10

It appears that human performance affects all four Services more or less equally. The GAO found that "During Fiscal years 1994-95, human error was a factor in 71 percent of Air Force mishaps, 76 percent of Army mishaps, 74 percent of Navy/USMC mishaps."[27]

> The Army Safety Center stresses the impact of human error on aviation mishaps. When accident causes are examined, a major issue in aviation safety remains human error. Although training and leadership can often bear some of the responsibility, it is generally the case that soldier indiscipline, inattention, or the willful neglect of published rules or safeguards is cited as a contributing actor.[28]

According to the Army, between fiscal years 1999 and 2001, the leading causes of Army aviation accidents were: In-discipline (28.4%), Leadership (17.8%), Training (13.6%), and Standards (10.1%). Materiel failures, by comparison, caused 2.5% of accidents.[29] Army records indicate that "individual failure" (e.g. crew coordination, overconfidence, indiscipline) was a causal factor in 90.9% of Class A mishaps in FY03.[30] These figures lend credence to human error being a major and consistent cause of aviation accidents for all services.

The Coast Guard details some of the kinds of human errors that can lead to mishaps. In FY2001, for example, 89 percent of Coast Guard mishaps involved incomplete, improperly followed, inappropriate or unavailable procedures. Fifty five percent of mishaps involved inattention, complacency, or lack of awareness. Twenty five percent of mishaps involved incomplete checklists and poor communication. Workload, feeling rushed or having a lack of resources were mentioned in almost 40 percent of Coast Guard mishaps. Inexperience, lack of training, and inappropriate staffing were also factors in 40 percent of mishaps in FY2001.[31]

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[26] Captain Kurt Grabow. Deputy Special Assistant for Safety Matters. OPNAV N09FB. "Naval Aviation Safety Briefing." February 28, 2002.

[27] "Military Aircraft Safety: Significant Improvements Since 1975." General Accounting Office. GAO/NSIAD-96-69BR. February 1996. P.24.

[28] *Flightfax* Aviation Safety Performance Review. May 28, 2002. U.S. Army. [http://safety.army.mil/home.html]

[29] Army Safety Program. "4th Quarter FY01 Roll-Up." [http://safety.army.mil/home.html]

[30] "Human Error in Army Aviation Accidents." *Flightfax*. November 2003. p.4.

Initiatives that might be pursued to improve military aviation safety

If policy makers wish to attempt to reduce aviation mishaps below their current rate, there appear to be four broad and interrelated areas where action could be taken: leadership, organization, budget, and aggressive fielding of safety technologies. Each of these options would have pros and cons.

Leadership. Considering the numerous, and often overlapping causes of military aviation mishaps, there is likely no single "silver bullet" that can significantly improve safety. However, many observers believe increased leadership on this issue may affect more mishap cause areas than any other single measure. Congress could consider requiring annual testimony on the status of military aviation safety to help motivate senior military leaders to take a more active role in promoting safety. The General Officers[32] who lead the Service safety centers might be directed to assess for Congress their Service's safety performance and make recommendations for improvements. Having the Service Chiefs, who are ultimately responsible for safety, testify would be another option.

As of October 2003, the DoD's recently established Defense Safety Oversight Council (DSOC) had held two meetings. To reflect its broad charter, the DSOC is divided into 10 task forces, which were established to "foster quick wins and other initiatives for implementation across DoD."[33] An Aviation Safety Improvements Task Force has been formed, and is chaired by Major General Ken Hess, Chief of Air Force Safety. The Aviation Safety Improvements Task Force's tasks are

> to recommend policies, programs, and investments to reduce aircrew fatalities, injuries and aircraft accidents. Assess, review, and advise on improving all aspects of existing/proposed aviation safety programs such as: Military Flight Operations Quality Assurance (MFOQA), Human Systems Integration, Other Aviation Safety Systems.[34]

The DSOC appears to have a clear and direct lines to DoD's top leaders. Monitoring the progress of the Aviation Task Force, and the implementation of its findings and recommendations may be an on-going focus of congressional oversight.

Organization. It is difficult for leaders to affect change if they do not have the organizational instruments to implement revised policies and procedures. Currently, two organizational issues stand out in the area of military aviation safety. First, the Office of the Secretary of Defense (OSD) is responsible for setting safety policies and providing oversight. However, there is not one individual in OSD whose sole responsibility is military aviation safety. GAO recognized this as a shortcoming in a January 2002 report:

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[31] *FY01 Aviation Safety Report.* U.S. Coast Guard. Health & Safety Directorate. Aviation Safety Division. P.11.

[32] The Marine Corps Safety Center is headed by a Colonel. The other Safety Centers are run by one or two star General Officers.

[33] *DSOC Task Forces.* October 6, 2003. Briefing found at DUSD (I&E) website. [https://www.denix.osd.mil/denix/Public/ES-Programs/Force/Safety/measure_merit.html]

[34] *Ibid*

> The office responsible for aviation safety currently occupies a relatively low organizational position within the Office of the Secretary of Defense (OSD). As a result of downsizing by OSD several years ago, five safety positions, which shared responsibility for aviation safety issues, were abolished and a single staff member hired. This staff member's responsibilities include aviation safety and a number of other responsibilities, including compliance with the Occupational Safety and Health Act of 1970 (OSHA), as amended; fire and emergency services; range and weapons safety; and traffic transportation.[35]

According to former OSD employees, at one time up to eight people in OSD worked exclusively on military aviation safety issues. If the current state of staffing inhibits OSD's ability to effectively execute its responsibilities in aviation safety, that may suggest that OSD leaders do not place a high enough priority on this issue.

The second organizational issue pertains to the Joint Staff and the Combatant Commands.[36] Currently, none of these organizations plays a significant role in promoting aviation safety or investigating mishaps. The Services, through their safety centers, conduct investigations, record and report mishaps, and generally promote aviation safety. However, DoD's guiding policy document on accident investigation, reporting and record keeping (DoD Instruction 6055.7, updated October 3, 2000) applies to the Joint Staff and the Combatant Commanders as well as the Services (Section 2 "Applicability and Scope."). This suggests that the Joint Staff and Combatant Commanders have the authority, and perhaps the responsibility, to take a more active role in aviation safety.

It is possible that the Services, and perhaps the Joint Staff and Combatant Commanders themselves, would resist increased Joint Staff/Combatant Commander participation in the safety process. However, it may be useful to explore what roles these organizations could play either to augment or even compete with the Service's safety processes. For example, could and should CINC's take an active part in investigating mishaps that occur in their geographic area of responsibility (AOR)? Are peculiar safety factors adequately considered when planning specific operations and exercises in their AORs? Could and should the Joint Staff take an active role in investigating accidents that involve more than one Service? Could and should the Joint Staff promote more standardized mishap recording and reporting among the safety centers?

Budget. Policy makers who wish to promote aviation safety could review three interrelated aspects of DoD's budget. First, a review of DoD's FY2004 budget request suggests that compared to the billions of dollars that are spent annually to repair or replace aircraft damaged or lost in mishaps, DoD requests little specifically for aviation safety. The Air Force – under the heading "Personal Safety and Rescue Equip." – requested $12.7 million in procurement ($5.3 million for "Night Vision Goggles", and $7.4 million for "Items Less than $5,000,000) and the Navy requested $105 million in O&M funding for aviation safety related activities. There was no apparent request for research into aviation safety.[37]

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[35] "Aviation Safety: FAA and DoD Response to Similar Safety Concerns." General Accounting Office. GAO-02-77. January 2002. p.3.

[36] Known as CINCs (for commanders in chief), examples include, U.S. European Command, U.S. Central Command, and U.S. Pacific Command.

It may be difficult for safety proponents to argue that the Services are spending too little on aviation safety, however, because of the second budget issue, which is that safety related equipment and initiatives are spread throughout the Services budgets, and at low levels of documentation. Aviation safety programs are not aggregated at a level that facilitates their identification, review and assessment. Many more Air Force programs than those mentioned above may contribute to aviation safety but are likely "buried" in the budget; aggregated under budget activities and line items such as "Aircraft Procurement," "Modification of Aircraft," or "Support Equipment and Facilities."

A third budget issue is that because of this "dis-aggregation" of aviation safety programs and efforts, safety does not compete well with other programs in the annual budget process. In 1997, the Defense Science Board reported:

> It appears that, because of budget procedures, military Services are not currently motivated to invest in safety technology that is likely to avoid down-stream loss of life and equipment, especially in non-combat aircraft. The emphasis has been and continues to be on equipment directly related to combat missions along with minimizing initial unit cost.[38]

Those wishing to promote aviation safety could seek ways to help safety programs and initiatives compete with other programs and to help the Services appreciate the long term benefit of spending near term dollars on safety.

One option would be to "fence off" money in DoD's budget specifically for aviation safety initiatives and programs. There is precedent for this kind of action. In their markup of DoD's FY2001 request, appropriations conferees adopted a Senate proposal to create the National Defense Airlift Fund. The purpose of this fund was to recognize airlift as an asset that benefits all the Services, and to protect airlift money from competition with other programs (such as fighter aircraft) in the Air Force budget.[39] Congress might weigh creating a Military Aviation Safety Fund to provide more resources and focus for basic and applied research on aviation safety.

Opponents of creating a fund in DoD's budget specifically for aviation safety, would likely argue that there are higher safety priorities. They may point out that there are more Class A accidents on the ground and more fatalities than there are in the air. For FY2002 and FY2003, for example, Army aviation experienced 11 flight and non-flight Class A mishaps and 13 fatalities. During that same time period, the Army experienced 99 ground Class A mishaps (on and off duty), resulting in 97 fatalities.[40] During FY03, the Marine Corps suffered 11 Class A flight mishaps, resulting in 16 fatalities. During this same time period, 107 Marines died in 97 ground mishaps.[41] If any area should be singled out for special attention, some may argue, it should be ground safety, not aviation safety.

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[37] *Procurement Programs (P-1)* Department of Defense Budget Fiscal year 2004. February 2003. Office of the Under Secretary of Defense (Comptroller). *Operation and Maintenance Programs (O-1).* Department of Defense Budget for Fiscal Year 2004. February 2003. *RDT&E Programs (R-1).* Department of Defense Budget for Fiscal Year 2004. February 2003 Office of the Under Secretary of Defense (Comptroller).

[38] Report of the Defense Science Board Task Force on Aviation Safety. February 1997. Office of the Undersecretary of Defense for Acquisition and Technology. Washington, D.C. February 27, 1997. P.14.

[39] See CRS Report RL30685, *Military Airlift: C-17 Aircraft Program* for additional information.

Another option would be to tie the procurement of new aircraft to a Class A mishap rate deemed acceptable. (This assumes that zero is not the desired rate.) The following illustrative scenario indicates how such a measure might work: In their FY20XX budget, the Navy requests 40 new F/A-18E/F aircraft. Ten of these requested aircraft would replace aircraft lost to Class A mishaps, which occurred at a rate of 2.0 per 100,000 flight hours. Safety advocates believe that this mishap rate is too high, and could be cut in half (1.0 per 100,000 flight hours). Therefore, funds would be provided for only half the replacement aircraft (five), to encourage the Navy to reduce mishaps in the future. Another option might be to transfer the funding requested for the remaining five replacement aircraft to the Military Aviation Safety Fund.

This option would have opponents. Some may oppose this approach because it appears to legitimize some level of mishaps. In the scenario above, a Class A mishap rate of 1.0 per 100,000 flight hours is considered "ok." This would be particularly distasteful to zero-mishap proponents. Others would oppose the strategy of linking aircraft procurement to a low mishap rate because they believe that it would result in a tangible loss of near term combat capability (aircraft) with no guarantee of improved safety in the future. Application of such measures would likely be subject to a comparison between the potential safety benefits gained and the operational capabilities lost or deferred.

Safety Technology. Many have argued that military aircraft do not tend to employ the same safety equipment as found in the civil sector, and that the Services tend to field safety equipment years after it is fielded in the civil world. According to one aviation safety law professor "military aviation lacks some of the essential safeguards of civil aviation."[42] The GAO found that the FAA mandated commercial aircraft employ two key safety technologies – Ground Proximity Warning Systems and Traffic Alert and Collision Avoidance Systems – decades before DoD began employing similar systems.[43]

Both the Defense Science Board and a government/industry Commercial Aviation Safety Team have drafted "short lists" of the safety technologies they believe would most improve safety in military and commercial aviation respectively. The Defense Science Board recommended DoD more aggressively invest in ground collision avoidance systems, flight data and cockpit video recorders, tactile situational awareness system (TSAS), night vision devices, and wind shear detection systems.[44] A recently completed Commercial Aviation Safety Team study assessed 700 safety technologies over five years and recommended 16 high impact proposals in the areas where mishaps most frequently happen: loss of control, approach and landing, and runway incursions.[45]

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[40] U.S. Army Safety Center. *Quarterly Report.* February FY03. [http://safety.army.mil/ipr/index.asp]

[41] *USMC Safety Statistics.* U.S. Marine Corps Safety Division. [http://www.hqmc.usmc.mil/safety.nsf/$about?OpenAbout]

[42] Russell Carollo. "31 Dead in Military Aviation Accidents Since Oct. 1." *Dayton Daily News.* March 3, 2002.

[43] "Aviation Safety: FAA and DoD Response to Similar Safety Concerns." General Accounting Office. GAO-02-77. January 2002. p.47-51.

The Services offer several arguments for why military aircraft do not always field the same safety equipment as found on commercial aircraft. Lack of funds is one argument, degradation of aircraft performance is another. However, Congress could evaluate the appropriateness of the new FAA safety recommendations for military operations, and weigh the soundness of Service arguments with other issues discussed in this report. For example, could investments in safety today achieve cost savings in the future?

Mr. Chairman, this concludes my remarks. Thank you for the opportunity to appear before you and discuss this important issue. I look forward to addressing any questions you or the committee may have.

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[44] Defense Science Board op cit. p.35.

[45] See Appendix III for specific recommendations.

DOCUMENTS SUBMITTED FOR THE RECORD

February 11, 2004

AV-8 Overview

- Previous 5 years mishaps/ rectifications
- HaRP (Harrier Review Panel)
  - Description
  - Meetings/ Findings
  - Recommendations
  - Where it stands
- Pilot training
- Funding
- Road Ahead to JSF

AV-8 History

- AV-8A has been out of service since 1987 (17 years)

- AV-8B is the only single engine TacAir platform that operates in the very demanding VSTOL environment from amphibious ships to austere Forward Operating Bases (FOBs)

- Since 1992, post “Desert Storm”, the AV-8B has participated in over 21 operations and continues to be forward deployed providing vital support in GWOT

- AV-8B “Day Attack”, which flew in Desert Storm, has been out of Fleet Squadrons since 2001. It has been Remanufactured and replaced by the newer Radar and Night Attack aircraft which supported and continue to support OIF and OEF

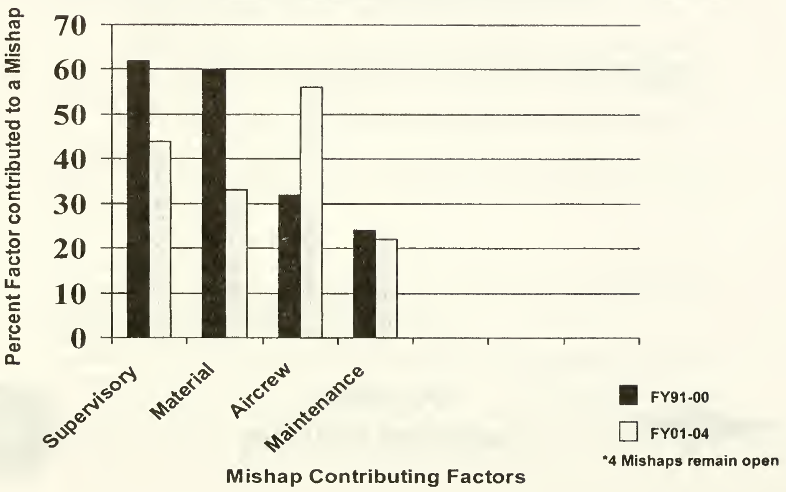
- AV-8B was the only DoN aircraft to utilize a Third Generation Targeting System to support OEF and OIF. The AV-8B provided accurate ISR information, precision targeting, gather accurate BDA, reduce chance of friendly fire and provided real-time SA to ground units

Mishap Review
FY99-04

- 18 AV-8B Mishaps since Oct 98
  - Major Contributing Factor:
    - 5 Aircrew
    - 5 Material (4 engine)
    - 3 Maintenance
    - 1 Undetermined
  - 4 Mishaps remain open
    - 16 Jul 2003 Out of control during ACM sortie (MCAS Cherry Point)
    - 23 Jul 2003 Aircraft departed runway (Bagram, Afghanistan)
    - 3 Dec 2003 Aircraft controllability problems on final approach (MCAS Yuma)
    - 8 Dec 2003 Engine failure in flight (MCAS Yuma)

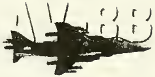
***Mishap investigations are privileged information and not for public use.**
Information obtained from the Naval Safety Center

AV-8B Mishap Factors



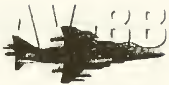
*4 Mishaps remain open

Material Factor Corrections



Problem	Discovered	Fix	Status/ Cost
Flaps	4 Mishaps dealing with uncommanded flap motion between 1986-1993	"Incremental" each mishap lead to failure identification (from coating to circuit cards to ECS changes). Resulted in pilot procedures change and DFC	Digital Flap Controller "Complete" $21M
Nose Wheel Steering	Aircraft departing runway during crosswind landing	Procedures change, New X-wind landing technique. New NWS system more forgiving High/Lo gain control	ECP-251R1 "46% of Fleet Installation complete" $11M
Ejection System	LtCol Younts death 1998	New helmet bayonet fittings; Installed 4 line release; Added parachute over-inflation control; New electronic altitude/airspeed sensor	"Estimate alt/airspeed senor complete 12 months" $6M No ejection related fatalities since 1998

Material Factor Corrections Cont.

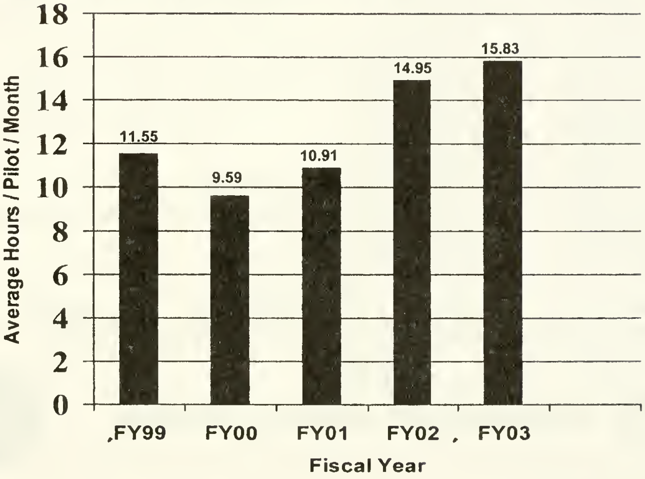


Problem	Discovered	Fix	Status/Cost
Engine program management/ # 3 bearing failure due to improper balancing	1999-2000 Multiple Engine Related Mishaps	-Ground the Fleet until problem could be determined -Establish Pegasus Independent Review Team (PIRT) to address engine shortcomings -Establish a comprehensive Engine Life Management Plan (Accelerated Mission Testing, Analytical Condition Inspections, Component Improvement Program, Lead the Fleet Engines, Mission Usage Tracking)	Comprehensive Engine Life Management Plan (ELMP) is in place and moving forward. Funded through FY09 =$163.54M Since ELMP established there have been ZERO engine related mishaps

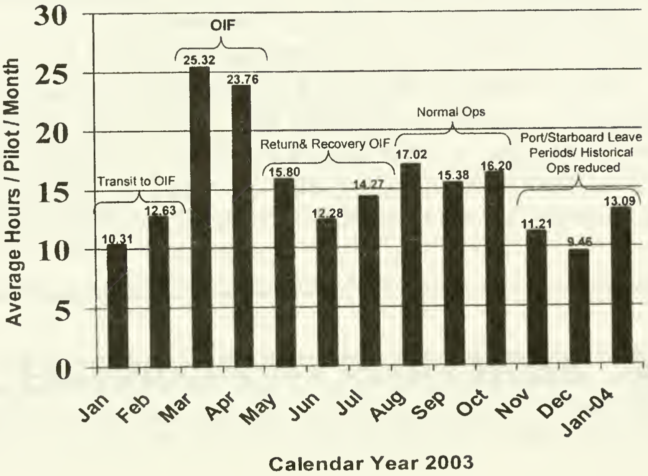
Mishap Factor Corrections Cont.

Problem	Discovered	Fix	Status/ Cost
Aircrew Factors	During Mishap Investigations	Increase in flight hours, Upgrade Simulators, Establish Multi-Task Trainers (MTTs) Increase Training in the Fleet Replacement Squadron (FRS), Increase Pilot Composite Score for AV-8B out of flight school. ORM review board established, continue to identify training innovations and technologies to reduce risk. CACE	Pilots average flight hours/ month has steadily increased. The training syllabus at VMAT-203 has been lengthened, world class electronic class room training environment has been established. Fleet representative aircraft used in training. Squadrons are receiving more capable pilots. Coherent Analytical Computer Environment test.
Maintenance Personnel Factors	During Mishap Investigations	Prime Contractor Augmented Maintenance/Training (PCAM/T), Contract Maintenance Support (CMS), Aviation Manpower (keep resident knowledge in squadrons longer)	In place in both MAG-13 & 14 15-20 contractors deployed with AV-8Bs

AV-8B Average Monthly Flight Time/Pilot

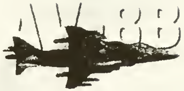


AV-8B Average Monthly Flight Time/Pilot Calendar Year 03



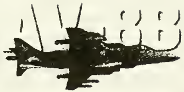
Average monthly hours per pilot 15.30

Establishment of the HaRP



The Harrier Review Panel was established by direction of the Commandant on 7 Nov 97. The "HaRP" charter calls for it to take an innovative approach to *analyzing mishap trends* within the Harrier community. The panel has obtained the participation of personnel from NASA and the NTSB, as well as safety directors for major airlines, allied officers, current and former Harrier CO's, and members of HQMC and NAVAIR staffs. The panel is tasked to *provide short and long-term solutions* that will *reduce the AV-8B mishap rate* and enhance community confidence in their aircraft, or more accurately -- in the institution's support of that aircraft.

HaRP
Seven Fundamental Needs



- Adequate funding for critical support activities
- State of the art engine monitoring technology
- Reinstate world class training of pilots
- Modernize maintenance personnel technical training
- Increase experience level in the squadrons
- Configure the AV-8B adequately for its mission
- Improve information management systems

The Panel made over 50 recommendations to address these needs. If the responsible agencies satisfy these seven requirements, a “best practices review” indicates that the Marine Corps can reasonably expect to achieve as much as a *50% reduction* in Harrier mishap rate.

Harrier Review Panel

Recommendation Status Summary

	Recommendation	Status	Comments
		3/25/2004	
Single Engine Reliability			
4.1.1.1	Accelerate Engine Monitoring System Ground Station Upgrade	Complete	$575k funded in FY00 by PBD-752. Fielding completed June 00. Phase 2 development initiated for aircraft.
4.1.2.1	Procure and Field Engine Vibration Test Sets	Complete	Initial fielding provided 3 per MAG @ O-level, 1 per I-level and 1 at NADEP. Second order outfits remaining squadrons, deployed ships and spares. 9 additional sets in second order.
4.1.3.1	Remove -406 engine from Service	In Progress	Driver is other TAV-8B upgrade kits; no accel possible. Reman schedule does single seat. Out of FMF in FY01, out of FRS in FY02
4.1.4.1	FOD Sweepers at Cherry Point	Complete	Completed in FY 98
Flyability			
4.2.1.1	FRS Resourcing Conference	Complete	Closed.
4.2 1.2	FRS Resourcing	Complete	All required aircraft on hand. IP's 22+ of 22 on-hand. Enlisted 235 of 222. Contract maintainers 31 of 31.
4.2.2.1	Combat Wingman	Complete	Up and running program. Will be ongoing.
4.2.3.1	Review Operational Commitments	Complete	Completed. No change in Lant. New Pac deployment concept.
4.2.4.1	SPN-41 Shipboard Navigation Aid Upgrade Schedule	In Progress	Fully funded for current schedule in PBD-752.
4.2.4.2/3	Self-Contained Approach	N/A	Requires OSCAR, funding put directed for OSCAR
4 2.5 1	Reschedule RNAWST flight simulator mods	Complete	Schedule deconflicted but lengthy. Working to shorten.
4.2.5.2	RNAWST Flight Simulator Visual Upgrade	Complete	Complete per HaRP language, cost SAVINGS realized through fleet effort with M2 DART visual system. Reapplied to do off-line rehost of NKT sim iso FRS restructuring. Remainder of fleet funded by Sim Master Plan.
4.2 5.3	Radar Intercept Trainers	Complete	Funded in USMC Sim Master Plan. $2.6M buys trainers in FY00, delivery in FY01.
	Green = complete or fully funded on track	▨	
	Yellow = issues in work or awaiting funds.		
	[redacted]		

Recommendation		Status	Comments
Maintainability			
4.3.1.1	MOS Staffing	In Progress	Optimum Force Mix dependent. TBD.
4.3.1.2	Lateral Move Restrictions	Complete	Successful FY99/FY00/FY01 execution completed.
4.3.1.3	6025 Addition to O-level	Complete	FY00 on track. 4 year implementation plan.
4.3.1.4	Contract Maintenance Support	Complete	O-level. Begun in FY99 by TyComs. Funded for 5 years (FY00 - FY04) in PBD-752. Phase out planned but linked to restoration of T/O. May need additional years.
4.3.1.5	Contract Logistics Support	Complete	I-level. Begun in FY99 by TyComs. Funded for 3 years in PBD-752. Phase out planned but linked to restoration of T/O. May need additional years. HaESC rec 5 year funding
4.3.1.6	Retain Key Prime Contractor Technical Support	Complete	Funded in FY98. No longer an issue.
4.3.1.7	FAP Review	Complete	Both coasts indicate that Harrier tasking is in fact, "fair shared" per HaRP recommendation language. No formal recommendations or cost per se from fleet, although initial feedback from MAGs indicates potential exists to outsource or eliminate some FAP b
4.3.1.8	Retention Efforts	Complete	Complete per HaRP language. Obviously an ongoing effort.
4.3.2.1	Career-level MOS Training	In Progress	MCAVRET: Powerline=Complete, Airframes= Pilot course, Avi/Seat Shop= In progress
4.3.2.2	Aviation Maintenance Training Continuum System (AMTCS) for O/I-level	In Progress	Fully funded by N889 through PMA-205 although schedule lengthy. PMA-205 moved schedule left. Engine courses have working prototype and have been delivered to FREST.
4.3.2.3	Use Maintenance Automated Training as Interim Training Management Tool	Complete	Authorized via N-881C per Naval Aviation Maintenance Program regulations.
4.3.3.1	NADEP Quality Update	Complete	Completed in FY98.
4.3.4.1	Non-advocate MALS Review	Complete	Completed in FY98.
4.3.5.1	Adequate PRL Funding	In Progress	Funded to NAVAIR 3.0 standard
4.3.6.1	Additional ILS Funding	N/A	During multi-year procurement negotiations, PMA indicated no ILS shortfalls.
4.3.7.1	Certify Critical Tasks	In Progress	Cost TBD. Estimate in development by FST.
4.3.8.1	Transition -408 to Modular Maint		Viable options in development by PMA.
4.3.8.2	Pegasus Safety Initiative	N/A	No longer required
4.3.9.1	CETS/NETS Review	Complete	Complete. No cost
	Green = complete or fully funded on track		
	Yellow = Issues in work or awaiting funds.		
	[illegible]		

Recommendation		Status	Comments
Warfighting Viability			
4.4.1.1	OSCAR ECP	In Progress	Funded, Howaver OSCAR Acceleration is an issue
4.4.1.2	Targeting Pod	Complete	Replaced by Litening II. 2 pods at China Lake. 7 pods at NKT w/ 542 training with pod.
4.4.1.3	Harrier II+ Laser Spot Tracker	N/A	Litening Targeting Pod fulfills requirement
4.4.1.4	Upgrade radios to ARC-210 standard	Complete	Fully funded as part of OSCAR.
4.4.1.5	Advanced CAS System	In Progress	Successfully flight tested. Looking into integrating ACASS functionality into TLDHS hardware.
4.4.1.6	IR Vulnerability	Complete	Addressed by standoff capability of Tgt Pod, LGBs end JDAM
4.4.1.7	Zero Retention Force Solenoid	In Progress	Fully funded by PBD-752. Begins FY02.
4.4.1.8	Urban Warfare Weapon	TBD	PMA-242 project for USMC. Competes in PPBS Monitoring development by USAF.
4.4.1.9	AMRAAM	TBD	Incorporated into Allied aircraft
4.4.1.1	ID/Prioritize Warfighting Upgrades	Complete	OAG task.
4.4.2.1	Improve Integration in MEU(SOC)	TBD	See brief.
4.4.2.2	MEU(SOC) Leadership Spots	In Progress	First CO and XO billets filled and completed, no further identified.
4.4.2.3	OMFTS Concept Cruise	N/A	No opportunity foreseen by operational commanders.
4.4.3.1	Waight Growth Management	Complete	Briefed by PMA-257 at Apr 99 HaRP.
Program Integration and Priorities			
4.5.1.1	HaRP Interim Progress Brief	Complete	Closed at HaRP meeting 5.
4.5.1.2	Institutionalize the HaRP	Complete	Closed at HaRP meeting 5
4.5.2.1	Revise OAG Charter	Closed.	Closed at HaRP meeting 5.
4.5.3.1	Info System Technology Demo	In Progress.	Coherent Analytical Computing Environment (CACE) ACTD in Yuma
4.5.4.1	Review Risk Assessment Process	Complete	Initial study complete. $53k from HaRP funding.
4.5.4.2	Critical Failure Modes & Maint	In Progress.	Include -1/-2 generators in accessory FMECA
4.5.5.1	Streamline ECP Process	Complete	Navy issue under AMSR HaRP review and Risk Assessment Process Review both indicated that "NavAir process" from identification to approval not a driving factor in vary extended timeline. ECP funding post-approval by far the "long pole."
4.5.6.1	Expedite Engine ECPs	In Progress.	ECP's identified in HaRP First Annual Report are all fully funded with various timelines for incorporation
4.5.7.1	Adequate PRE Funding	In Progress.	Sustainment of a/c issue
4.5.8.1	Change PMA-257 T/O	Complete	Closed.
4.5.9.1	MAG-14 Staffing	Complete	Closed.
4.5.10.1	Review Ejection Seat Design	Complete	Upgrades currently being incorporated into fleet.
4.5.10.2	Policy on Weight and Selection	Complete	Closed
	Green = complete or fully funded on track.		
	Yellow = issues in work or awaiting funds.		
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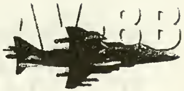
HaRP Funding (Historical)

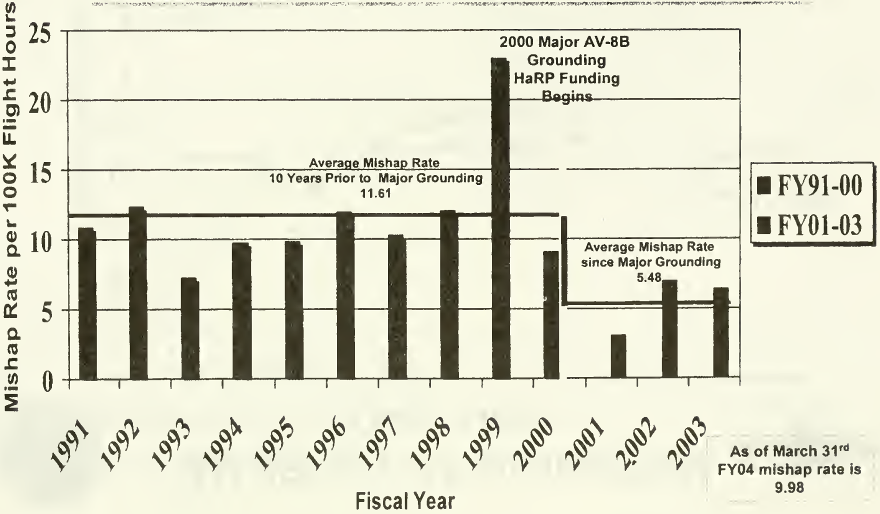


HaRP Safety Upgrades	Funds	FY00	FY01	FY02	FY03	FY04	FY05	TOTAL
Engine Monitoring System	O&MN	0.575						0.575
SPN-41 Navigation Aid on L-Class	OPN		1.800	1.500				3.300
Self-contained Approach to Ship	O&MN			8.250	1.290			9.540
Contractor Maintenance Support	O&MN	2.400	2.400	1.800	1.800	1.800	1.800	12.000
Contractor Logistic Support	O&MN	0.800	0.800					1.600
PRL Funding	O&MN	4.000	6.189	5.687	4.430	5.498	3.212	29.016
Integrated Logistics Support	O&MN			17.500				17.500
PRE Funding	O&MN	4.550	3.660	3.460	3.343	3.067	2.923	21.003
Ejection Seat Design	RDT&EN	0.670						0.670
	APN-5	2.010	2.090	1.000				5.100
Subtotal		15.005	16.939	39.197	7.52	7.298	3.212	89.171
HaRP Readiness Upgrades								
Laser Spot Tracker for II+	RDT&EN		13.061	15.063				28.124
	APN-5				3.280	4.080	1.788	9.148
Zero Retention Force Solenoid	RDT&EN			4.740	1.160			4.740
	APN-5				1.200	0.520		1.720
Subtotal			13.061	19.803	4.480	4.600	1.788	43.732
PBD-752 Total		15.005	30.000	59.000	12.000	11.898	5.000	132.903

HaRP Committee Status

- HaRP Meetings
  - 1st HaRP Meeting Dec 1997
  - 6 Additional meetings from Feb 98 – Feb 02
- HaRP Authority passed to the HESC
  - Feb 02 appoints Harrier Executive Steering Committee (HESC) as the executive agent for the HaRP
  - HESC provides semi-annual updates on the status of HaRP recommendations
- DC/A reestablished oversight of the HaRP (2 Mar 04)
  - Continue to address HaRP issues within the AV-8B Readiness Manage Plan (RMP)

AV-8B Average Mishap Rates



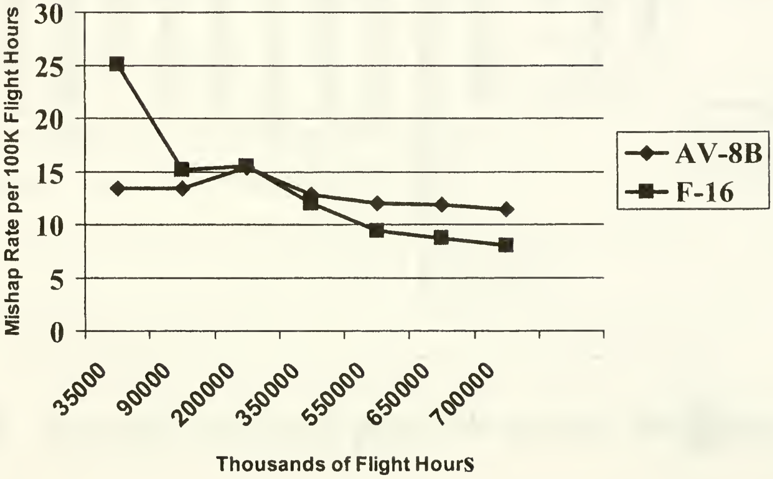
2000 Major AV-8B Grounding HaRP Funding Begins

Average Mishap Rate 10 Years Prior to Major Grounding 11.61

Average Mishap Rate since Major Grounding 5.48

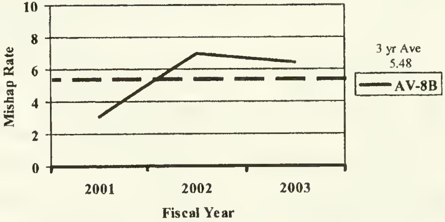
As of March 31rd FY04 mishap rate is 9.98

AV-8B vs F-16 Mishap Rate Over Time



3 Year Mishap Trend

AV-8B



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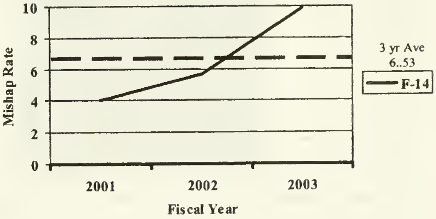

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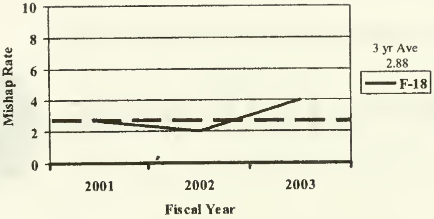


Summary of Funded Programs

OSD-05 Controls ($M)

APPN	Description	Prior Years	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	To Complete	Total
APN-1												
	Production Line Transition	5.8	12.5	4.7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		24.9
APN-5												
1-91	Omnibus O&S Improvements	92.2	1.6	1.2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		95.0
3-96	KAPTON Wire Replacement	33.6	1.3	1.1	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		36.1
25-99	TAV-8B Performance Upgrade	102.3	2.0	2.0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		106.3
23-00	Litening II Pod	148.7	*37.0		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		185.7
12-02	OSCAR	37.7	9.9	11.4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		127 3
06-03	Zero Retention Force	1.5	1.5		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		2.9
02-04	Engine Life Management Program		4.6	5.2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1 2	31.9
XX-06	Obsolescence Replacement				[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		34 1
RDT&E												
H0652	Readiness Management Plan				[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		27.9
	Engine Life Management Program	13.2	2.3	6.0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2.7	60 7
	Tactical Aircraft Moving Map Capability		*5.7	5.7	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		15.7
TOTAL		**434.9**	**78.3**	**37.4**	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	**3.9**	**748.4**

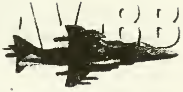
*** Relects FY04 Appropriations Bill**

AV-8B Way Ahead
Safety/Reliability

- Engine Life Management Program (ELMP)
- Readiness Management Program (RMP)
- Intermediate Maintenance Program (IMP)
- Harrier Review Panel (HaRP)
- Training and Readiness Review (T&R)
- Open Systems Core Avionics Requirement (OSCAR)
- TAV-8B Upgrades
- Simulator Upgrades
- Multi-Task Trainers (MTTs)

AV-8B Way Ahead Relevancy

- Open System Core Avionics Requirement (OSCAR)
- Joint Direct Attack Munitions (JDAM)
  - 1000lbs/ 500lbs
- Litening Advanced Targeting Pod (Litening AT)
- Litening Video Downlink
- MAGR 2K (Miniature Airborne GPS Receiver)
- AVJMPS (AV-8 Joint Mission Planning System)
- Reduced Size Link-16 (Data Link)
- JTRS (Joint Tactical Radio System)



Backup Slides

AV-8A vs AV-8B

Very Little In Common Except STOVL Capability

AV-8A Harrier I

Len. 45.55 ft
Span 25.27 ft
Height 11.25 ft
Weight 12191 lbs

IOC - 1971

AV-8B Harrier II *Plus*

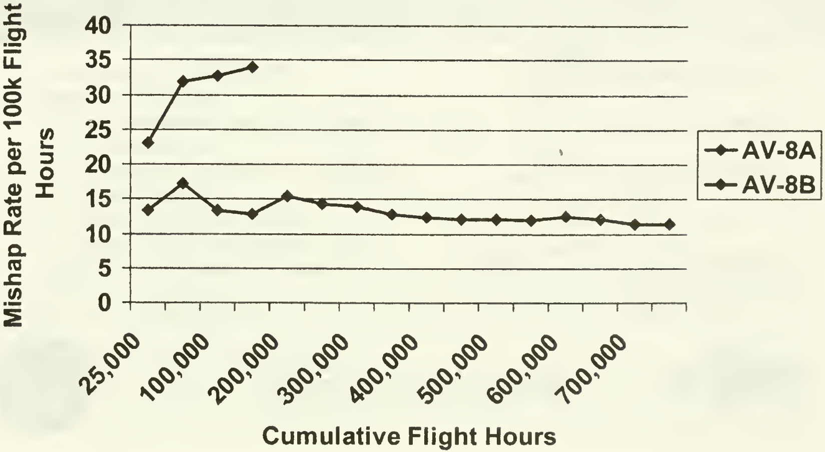
Len. 47.75 ft
Span 30.33 ft
Height 11.65 ft
Weight 15391 lbs

IOC - 1984

	AV-8A	AV-8B
Manufacture	Hawker Siddley (BAE) Production	McDonnell Douglas (Boeing) New Tools/ New Build
Engine	RR 402	RR 408 (12% More Thrust)
	Hydraulic Fuel Control	Digital Fuel Control
Wing	Aluminum	Composite (30% More Wing Area) Super Critical Airfoil Design Leading Edge Root Extension Maneuvering Flaps
Fuselage	Aluminum/Steel	Composite/Aluminum Raised Cockpit, New Inlet, Lift Improvement Device
Fuel	5200 lbs + 2 Tanks	7,759 lbs + 4 Tanks
Avionics	Electrical/Gauges	Computer-Bus; Glass Cockpit Flight Control Computer
Weapons	Iron Sight, 4 Stations, Dumb Bombs	Radar/Night Attack, 7 Stations, Smart Weapons

Major Differences in Design, Production, Systems, Performance & Capabilities
Any Objective Analysis Must Address Each as a Different Aircraft

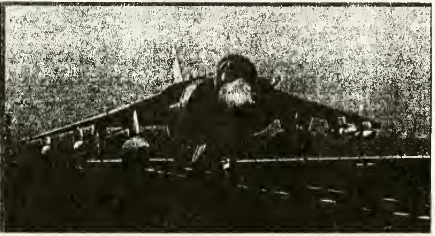
AV-8A vs AV-8B Mishap Rate Over Operational Life



DESERT STORM

- 66 AV-8Bs (Day) Based at Jubail
  - Sustained 2.0 sorties/day/ac (37 days)
  - Surge 3.6 sorties/day/ac (5 days)
  - 3138 sorties flown
- 20 AV-8Bs (Day) based on USS Nassau
  - 242 sorties flown
- Total sorties flown 3380/ 2937 Tons of ordnance dropped
- >90% Mission Capable Rate

- Tanajib-Ground War (236 sorties/ 187 tons of ordnance dropped)
  - Most forward deployed TACAIR
  - 4000 feet usable runway
    - Decreased time to target by 50%
    - Increased time on station by 60%
    - No airborne tanker assets required



AV-8B
Real World Operations Since DESERT STORM

Date	Operations	Forces	Location
Aug 92 – Dec 92	*PROVIDE RELIEF*	III MER UNITS, 11TH MEU (SOC)	Somalia
Dec 92 - Mar 94	*RESTORE HOPE*	I / III MEF Units, 11th,13th MEU (SOC)	Somalia
Apr 94	*DISTANT RUNNER*	I / III MEF Units, 13th MEU (SOC)	Rwanda
Jan 95 -Mar 95	*UNITED SHIELD*	I / III MEF Units, 13th MEU (SOC)	Somalia
Jul 92 - Mar 96	*PROVIDE PROMISE*	Wasp, Guam, Saipan ARG: 22nd, 24th, 26th MEU (SOC)	Bosnia
8 Jun 95	*O'GRADY RESCUE*	24th MEU (SOC) from II MEF	Bosnia
Apr 96 - Aug 96	*ASSURED RESPONSE* Liberia	22nd MEU (SOC), SPMAGTF II MEF units	Liberia
May 96 - Aug 96	*QUICK RESPONSE*	22nd MEU (SOC), SPMAGTF	Central African Republic
Jun 92 - Dec 95 transitioned to:	*SHARP GUARD*	22nd, 24th, 26th MEU (SOC)	Balkans
Dec 95 - Dec 96 transitioned to:	*DECISIVE ENGAGEMENT*		
Dec 96 - Present	*DECISIVE ENDEAVOR*		
Mar 97	*SILVER WAKE*	26th MEU (SOC)	Albania

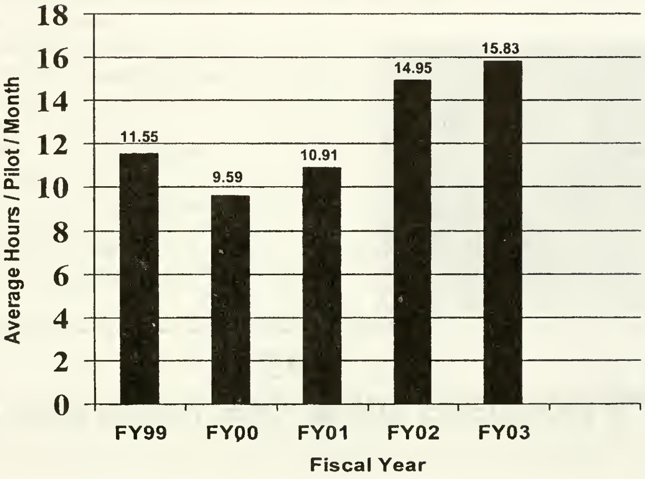
AV-8B
Real World Operations Since DESERT STORM

Date	Operations	Forces	Location
Aug 92 - Present	*SOUTHERN WATCH*	2d and 3d MAW Units	Iraq
Dec 95 - Dec 96	*JOINT ENDEAVOR*	22nd, 24th, 26th MEU (SOC)	Bosnia/Herzegovina
transitioned to:			
Dec 96 - Present	*JOINT GUARD*	I and II MEU (SOC), SPMAGTF	
Apr 97 - May 97	*GUARDIAN RETRIEVAL*	22nd & 26th MEU (SOC)	Zaire/Congo
Jun 97	*NOBLE OBELISK*	22nd MEU (SOC)	Sierra Leone
May 98	*DETERMINED FALCON*	26th MEU (SOC)	Kosovo
Apr – Jun 99	*ALLIED FORCE*	24th & 26th MEU (SOC)	Kosovo
28 Sep 01-15 Oct 03	*ENDURING FREEDOM*	13th, 15th & 26th MEU (SOC) 11th , 22nd 24th MEU (SOC) VMA-513	Afghanistan
Jan 03-Present	*IRAQI FREEDOM*	MAG-13, MAG-14	Iraq

OPERATION ENDURING FREEDOM
OEF

- 28 Sept 2001- Oct 2003 (Deployment Coverage)
  - 15th MEU (6 AV-8Bs, 28 Sep 0- Dec 01)
  - 26th MEU (6 AV-8Bs, Nov 01- Mar 02)
  - VMA-513 (-) (6 AV-8Bs, Sep 02- Sep 03)
- Operating Bases
  - USS Ship, off coast of Pakistan
  - Kandahar, Afghanistan
    - 2700 ft usable runway
    - Increase responsiveness, decrease transit time
    - Negated tanker support need
  - Bagram Afghanistan
    - Austere airbase, 90ft useable runway width, 4900 ft elev
    - Rocket, mortar and small arms fire forced lights out T/O and Landings.
- Operational Stats
  - Missions: Escort, CAS, Strike, Arial and Armed Reconnaissance
  - Day, night and all weather support provided
  - 1686 sorties, 5936 hours flown
  - 98,000lbs of ordnance delivered

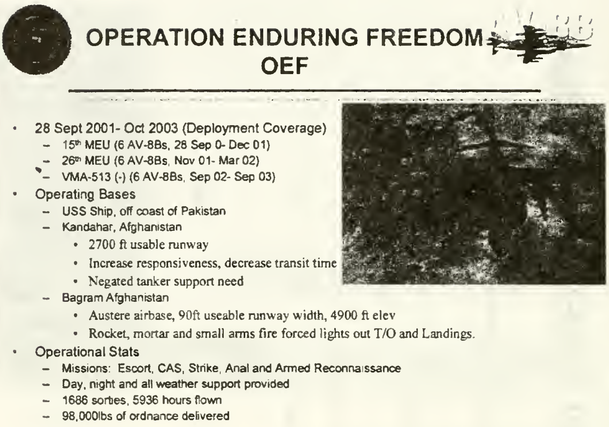
AV-8B Average Monthly Flight Time/Pilot



OPERATION IRAQI FREEDOM
OIF

- 20 Mar – 20 Apr 2003
  - – 60 AV-8Bs based on amphibious ships (Persian Gulf)
  - – 16 AV-8Bs based at Al Jaber (Kuwait)
- Operations
  - – 24-hour Precision Strike, CAS, Armed and Aerial Reconnaissance
  - – Day, Night and all weather operations
  - – Real time Intelligence, Surveillance and Reconnaissance (ISR)
  - – FOB and FARP operations
    - Reduced reliance on airborne tankers
    - Provided more responsive ground alert aircraft
    - Increased sortie generation rates
- Operational Stats (20 Mar- 20 Apr 03)
  - – 2182 sorties flown
  - – 3626 hours flown
  - – 79% of ordnance dropped were PGMs
  - – 478 point targets destroyed (BDA positively confirmed) to date.
  - – ***No*** Friendly Fire incidents ʼ

4/12/03



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28 May 04

INFORMATION PAPER

Subject: AV-8B Safety and Readiness

1. **Purpose**. Provide an overview of AV-8B safety and readiness.

2. **Executive Summary**. The AV-8B has had two unfortunate mishaps early in FY04 following unprecedented operations tempo supporting OIF and OEF during FY-03. The AV-8B fleet has been relied upon, due to its unique characteristics, to provide the TacAir support the U.S. requires to fight the GWOT and support collation forces.

3. **Background**

- Safety
  -During early 2000 the AV-8B had a lengthy grounding, for engine related problems, after a series of mishaps.
  -The average historical mishap rate of the AV-8B is 11.31 mishaps per 100,000 flight hours.
  -Since the grounding in 2000 an Engine Life Management Program (ELMP) was implemented and the mishap rate has dropped to an average of 5.4 mishaps per 100,000 hours over the last three years (FY01-03).
  -Mishap rate for FY 2000=9.05
  FY 2001=3.09
  FY 2002=6.96
  FY 2003=6.51
  *FY 2004=7.51 to date

  *The AV-8B has only flown 26,000 hours during this reporting period causing a higher mishap rate still early in the FY-04 reporting year.

- Aircraft Readiness
  -Since the AV-8B grounding in 2000, aircraft readiness has steadily increased.
  -CNO Mission Capable (MC) Goal = 76%
  -MC readiness rate in Oct 2000 was 35% due to the need to rebuild the Harrier engines, by Sept FY02 the MC readiness rate increased to **73.5**%. In FY03, with 90% of the AV-8B fleet supporting operations around the world, Harriers maintained an average of **79.3**% supporting OIF. AV-8Bs supporting OEF in FY03 maintained an average MC rate of **83.2**%.

- Flight Hours
  Since the AV-8B grounding in 2000 there has been a steady increase in executed flight hours and average flight hours per pilot per month.

Year	**FY-01**	**FY-01**	**FY-02**	**FY-03**
Pilot (Hrs/month)	**9.59**	**10.91**	**14.95**	***15.83**

*Executed flight hours and pilot flight time was effected by the unprecedented number of pilots and aircraft deployed onboard ships during this period. Long transit times, operational pauses, turn around maintenance, and leave periods all contribute to reduced flight time.

- The problems discussed in the December 2002 LA Time's articles focused on 4 primary material problems causing AV-8B mishaps: Flaps Controller, Engine, Nose Wheel Steering, and Ejection System.
  -The Flaps Controller was replaced with a new Digital Flaps Controller, since installation there have been *no Flap related mishaps.*
  -The engine program underwent an extensive Engine Life Management Program (ELMP) with increased funding to further test the F402 Engine. Since ELMP was instituted in 2000, there have been *no engine related mishaps.*
  -The Nose Wheel Steering (NWS) system was redesigned and is being incorporated into all fleet aircraft. Since the redesign of the NWS system there have been *no NWS related mishaps.*
  -The Ejection System in the AV-8B is currently being upgraded to address all ejection related mishaps including: 4 line release, Electronic Airspeed/Altitude Sensor, upgraded Helmet and Visor and Parachute Over Inflation Controller. Since the beginning of installation of these upgrades there have been *no ejection related deaths.*

- **OIF** Operational Employment
  -60 AV-8Bs embarked on amphibious ships, 16 AV-8Bs shore based.
  -Provided Coalition Forces with 24-hour Precision Strike, Close Air Support, Armed and Aerial Reconnaissance assets during day, night and adverse weather conditions.
  -Provided operational flexibility utilizing sea basing, roads and Forward Operating Bases (FOBs).

-AV-8B Short Takeoff and Vertical Landing (STOVL) capability provided the ability to significantly increase the number of Tactical Strike aircraft and sorties in theater by operating from amphibious ships. Due to overcrowded airfields and insufficient numbers of available aircraft carriers, forty-five percent of 3rd Marine Aircraft Wing's TACAIR assets were based aboard amphibious ships.
-Validated Expeditionary Operations. Ship and main base operations, coupled with an AV-8B FARP, reduced reliance on tankers, provided more responsive ground alert aircraft and increased AV-8B sortie rates. FOBs and FARPs also:
  -***Doubled*** sortie generation rate for ship-based aircraft.
  -***Halved*** shipboard workload and ordnance usage.
  -***Minimized*** shipboard re-supply concerns.

- Statistics for AV-8Bs in **Iraqi Freedom** from 20 Mar- 20 Apr 2003
  -2182 sorties flown.
  -3626 hours flown.
  -79.3% average aircraft readiness rate.
  -79% of the ordnance dropped were precision-guided munitions.
  -478 point targets destroyed (BDA positively confirmed) to date.
  -*NO* combat loses or aircraft damaged by enemy fire.
  -*NO* "Friendly Fire" incidents.

- **OEF** Operational Employment
  -AV-8Bs supported *Enduring Freedom* from both ship and shore bases. (6 AV-8B 15th MEU, 6 AV-8Bs Det VMA-513)
  -Ship based AV-8Bs were among the first TacAir assets to be in a position to support operations in Afghanistan, due to ability to be forward based, arriving in theater on 28 Sept 2001.
  -AV-8Bs were based at Bagram airbase to support OEF. This austere, forward deployed base had an elevation of 4,900 and a usable runway width of only 90 feet (Standard runway width is 150-300ft).
  -Bagram airbase was often under attack by rockets, mortars and small arms fire requiring night operations to be flown lights out for takeoff and landing.
  -Coalition forces were supported during day, night and adverse weather conditions. This support included: Escort, CAS, Strike and Armed and Aerial Reconnaissance.

- Statistics for AV-8Bs in **Enduring Freedom**.

-1686 sorties flown.
-5936 hours flown.
-83.2% average aircraft readiness rate.
-*NO* combat losses or aircraft damaged by enemy fire.
-98,000lbs of ordnance employed.

4. **Summary**. Approximately *Ninety* percent of our Harrier Fleet was committed to operations around the world during FY-03. Harrier readiness and pilots monthly flight hours have continue to increase while the average AV-8B mishap rate has decreased since the major aircraft grounding in FY-00. Despite the increased operations tempo and large scale AV-8B deployment to support Operations Enduring Freedom and Iraqi Freedom, the Harrier safety and readiness trends through FY-03 continue to be positive. The AV-8B has played, and continues to play, a critical role in the GWOT.

20 May 03

INFORMATION PAPER

Subject: AV-8Bs in OPERATION IRAQI FREEDOM (OIF)

1. Purpose. Provide information on AV-8B employment and performance in OIF.

2. Key Points
- AV-8B employment in OIF
  - 60 AV-8Bs embarked on amphibious ships, 16 AV-8Bs shore based.
  - Provided Coalition Forces with 24-hour Precision Strike, Close Air Support, Armed and Aerial Reconnaissance assets during day, night and adverse weather conditions.
  - Provided operational flexibility utilizing sea basing, roads and Forward Operating Bases (FOBs).
  - Provided precision targeting capability.
  - Provided a manned real time Intelligence, Surveillance and Reconnaissance (ISR) platform.

- AV-8B *Amphibious Ship basing*
  - AV-8B Short Takeoff and Vertical Landing (STOVL) capability provided the ability to significantly increase the number of Tactical Strike aircraft and sorties in theater by operating from amphibious ships. Due to overcrowded airfields and insufficient numbers of available aircraft carriers, forty-five percent of 3rd Marine Aircraft Wing's TACAIR assets were based aboard amphibious ships.
  - Allowed aircraft to operate close to the battle space and therefore not required to compete for very limited air refueling assets.

- AV-8B *Forward Operating Base* (FOB) Operations in Kuwait
  - Full capability to refuel (hot or cold) and re-arm (all types of ordnance and expendables).
  - Complete "O" Level maintenance capability 24 hours a day.
  - Instrument Flight Rules (IFR) takeoff and landing capability provided both precision and non-precision approaches.
  - Aircraft would launch from the ship, fly a mission, and then proceed to the FOB for re-arming and refueling. After flying a second mission from the FOB they would return to the ship.
    - ***Doubled*** sortie generation rate for ship-based aircraft.
    - ***Halved*** shipboard workload and ordnance usage.
    - ***Minimized*** shipboard resupply concerns.

- AV-8B *Forward Arming and Refueling Point* (FARP) Operations in Iraq
  - Less than 100 miles and within 15 minutes flying time to Baghdad.
  - Established 4 April as war moved north to provide greater sortie Time on Station (TOS) and increased range, without reliance on limited airborne refueling assets.
  - First TACAIR aircraft in OIF to conduct sustained operations from an airfield inside Iraq.
  - Limited re-arming and maintenance capability.
  - Primarily used as a "Ground Based Tanker" refuel point for missions into central and northern Iraq.
  - Visual Flight Rules (VFR) only capability.
  - 206 Harrier sorties flown from FARP.

- Facilitated forward positioning of aircraft to stand ground alert, reducing response time as compared to ground alert aircraft flying from Kuwait or ships (<15 min vs. 45 min to 2 hour response time).

- AV-8B *Road Site* Operations in Iraq
  - Located less than 70 miles from Baghdad.
  - Limited Road Site Operations were conducted due to operational and security concerns.
  - 4 sorties utilized road sites for refueling.
  - Increased TOS and range allowing operations to be conducted deep inside Iraq without the use of very limited airborne tanker assets.

- AV-8B Precision Targeting in OIF
  - AV-8Bs employed two versions of the LITENING Pod, the Enhanced Range (ER) targeting pod and LITENING ISR targeting pod.
  - Using LITENING ER the AV-8B had the ability to locate, identify and confirm targets, allowing timely engagements and greater effectiveness than any other DoN TACAIR aircraft.
  - Provided the AV-8B the capability of "stand-off" targeting outside SAM threat envelopes. This capability allowed the AV-8B to engage targets from a sanctuary while complying with Rules of Engagement (ROE) and Positive Identification (PID) criteria.
  - The AV-8B using the LITENING ER with its infrared (IR) marker was able to positively confirm targets with ground units and airborne controllers at night, greatly reducing the chances of "friendly fire". The AV-8B is the only aircraft in the DoN with this inherent capability in its targeting pod.
  - AV-8B equipped with LITENING ER taped and documented all missions, providing extremely accurate battle damage assessments (BDA) and intelligence information.

- AV-8B LITENING ISR Targeting Pod
  - AV-8B using the LITENING ISR pod had all the attributes of the ER pod and in addition was able to provide *real-time* video to ground units increasing their situational awareness and aiding in Time Sensitive Targeting (TST). This capability allowed the ground Forward Air Controllers (FAC) to talk AV-8Bs onto targets other aircraft could not find.
  - The LITENING ER, employed on the AV-8B, is the only targeting pod in the DoD to have the capability to send live video of exactly what the pilot is seeing to the forces on the ground. This capability can provide positive identification of a target, aid in TST, and mitigate the risk of "friendly fire" incidents.
  - The LITENING ISR pod provided real time intelligence, during the rescue of an Army POW, PFC Lynch. Real time video was sent from the AV-8B LITENING ISR targeting pod to ground units on the route to the objective and of the enemy situation around the objective.

- Statistics for AV-8Bs in OIF from 20 Mar- 20 Apr 2003
  - 2182 sorties flown.
  - 3626 hours flown.
  - 79.3% average aircraft readiness rate.
  - 79% of the ordnance dropped were precision-guided munitions.
  - 478 point targets destroyed (BDA positively confirmed) to date.
  - 375 tons of ordnance dropped.

- *NO* combat loses or aircraft damaged by enemy fire.
- *NO* Friendly Fire incidents.

- AV-8B Lessons Learned
  - The LITENING Targeting Pod is extremely effective in combat. It provided for rapid target PIDs for pilots and ground personnel, while reducing the possibility of collateral damage and fratricide.
  - Validated Expeditionary Operations. Ship and main base operations, coupled with an AV-8B FARP, reduced reliance on tankers, provided more responsive ground alert aircraft and increased AV-8B sortie rates.
  - Validated that existing ordnance requires a heavy logistics train. To be a lighter and more responsive force the need to acquire lighter, lower yield weapons (Small Diameter Bomb/Joint Common Missile) is essential.
  - Validated the Marine Corps' vision for an all STOVL force projecting combat power throughout the spectrum of operating environments.
  - AV-8Bs were unable to support strike operations requiring Joint Direct Attack Munitions (JDAM). The DoN and NAVAIR needs to accelerate AV-8B Open System Core Avionics Requirement (OSCAR) testing to provide full JDAM capability to the AV-8B fleet.

3. Summary. Approximately *Ninety* percent of our Harrier Fleet was committed to operations around the world during OIF. They have played, and continue to play, a critical role in the Global War on Terrorism (GWOT).

QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD

FEBRUARY 11, 2004

QUESTIONS SUBMITTED BY MR. HUNTER

The CHAIRMAN. How many cases of fatigue or structural failure have Army aircraft had in the past several years.

General SMITH. Since FY 1993, there have been a total of 1,390 Class A–C aviation accidents (202 Class A, 171 Class B, and 1,017 Class C). Of these, 57 or 4.10% had corrosion, metal fatigue, or metal stress as a contributing factor. Specifically, 15 of these 57 accidents were corrosion related (see below)

Count of AMC	Army Mishap Class			
FY	**A**	**B**	**C**	**Grand Total**
1993	1	1	4	6
1994	1		3	4
1995	1	1	11	13
1996		1	4	5
1997			4	4
1998			5	5
1999	2		5	7
2000			5	5
2001	1		1	2
2002	1	1	2	4
2003			2	2
Grand Total	7	4	46	57

The aircraft involved in the corrosion, fatigue and metal stress accidents are listed below.

Count of Aircraft type	
Aircraft type	**Total**
AH1	3
AH64	13
C23	2
H47	15

The CHAIRMAN. General Hess, you mentioned that 70 percent of Air Force passenger aircraft have the so-called traffic collision avoidance system. All commercial aircraft, as I understand it, have had this system since 1993. Is there any reason for not having the other 30 percent of our folks hooked up?

General HESS. The Air Force has aggressively upgraded over 80 percent of its passenger aircraft with a traffic collision avoidance system. The remaining 20 percent are funded and programmed as follows: The C–17 fleet will complete its last eight aircraft upgrades by October this year. Of the 615 C–130s, approximately 100 aircraft will not be upgraded since they will retire in less than 5 years and the rest will be equipped during the Avionics Modernization Program.

The CHAIRMAN. Have you made any requests for safety mods on the AV–8B that have not been supported or have gone unfunded?

General HELLAND. The AV–8B Engine Life Management Program (ELMP) was cut by $7M in FY04. This funding adjustment resulted in the cancellation of Engine Monitoring System (EMS) upgrades and various engineering projects (EPDs), and the incremental funding of Accelerated System Maintenance Endurance Testing (ASMET). ASMET is designed to detect failures prior to the appearance of those failures in fleet aircraft. EMS improves Inlet Guide Vane trending data and software coding, and while funding restoration was included on the FY05 Marine Corps Unfunded Programs List, it currently remains unfunded.

The Readiness Management Program (RMP) is a proactive program to address AV–8B obsolescence issues, readiness degradation, and control costs in order to avoid steep rises in Aviation Depot Level Repairables (AVDLR). Due to numerous obsolescence, deficiency, and structural life issues, the AV–8B will experience increased cannibalization and higher component failure rates in the future. RMP is a POM–06 issue that is only partially funded due to competing priorities and fiscal constraints.

[See brief in the Appendix on page 135.]

The CHAIRMAN. Are there any systems out there that are safety-enhancing that could be applied to the AV–8B program that haven't been applied? What are those systems?

General HELLAND. The President's Budget balances the priorities of safety, capability, and affordability for the AV–8B. However, if additional funds were available, investments in AV–8B system reliability programs such as the Readiness Management Program and the Engine Life Management Program (including improvement of the current Engine Monitoring System) would help address aging issues that typically impact accident rates. These investments would also provide a limited prognostic capability, which would enhance safety.

Prognostic monitoring technology currently requires significant developmental work regarding instrumentation, sampling, analysis, data fusion, and false alarm reduction. Prognostic Engine Monitoring holds great promise but cost/benefit ratios make it prohibitively expensive for legacy platforms.

The AV–8B is significantly more stable in a hover than its predecessor, the AV–8A, as reflected in a greatly improved accident rate. A stability augmentation system might further improve this margin, but requires extensive flight tests and a digital flight control architecture similar to that under development for the Joint Strike Fighter.

QUESTIONS SUBMITTED BY MR. MCKEON

Mr. MCKEON. Please address the AV–8B Marine Corps Harrier mishaps in calendar year 2003. Specifically, what are the causes of those accidents and what corrective measures have been taken (or are you taking) to fix the aircraft and alleviate the problems? Please also include the status of the investigations of the most recent crashes in December of last year.

General HELLAND. There were 5 total AV–8B mishaps during CY03. The following is the status of the investigations as of 10 Sep 04.

* 1 Mishap closed: 1 Apr 03 Controlled flight into terrain during shipboard operations (Arabian Gulf)

5 of 6 recommendations have been completed. Four of the completed recommendations consisted of additional training for Harrier aircrew and aircraft controllers within their local units. The fifth completed recommendation consisted of a change in procedures for aircraft controllers during Harrier operations at sea. The last recommendation is pending action by NAVAIRSYSCOM and consists of an evaluation of the communication requirements for shipboard ops.

* 4 Mishaps remain open

* 16 Jul 2003 Out of control during ACM sortie (MCAS Cherry Point)

* 23 Jul 2003 Aircraft departed runway (Bagram, Afghanistan; aircraft will be repaired)

* 3 Dec 2003 Aircraft controllability problems on final approach (MCAS Yuma)

* 8 Dec 2003 Engine failure in flight (MCAS Yuma)

[See brief in the Appendix on page 135.]

Mr. MCKEON. Is the current training for an AV–8B pilot adequate? Are there any other changes, besides those that have already been implemented, that would further improve pilot safety?

General HELLAND. The current Training and Readiness syllabus prescribes a comprehensive training program for AV–8B pilots. Squadrons utilize this syllabus, in conjunction with advanced schools, simulation, and scenario-based training, to produce tactically and technically proficient pilots. The excellent performance of AV–8B units in recent operations in the Global War on Terror attests to the effectiveness of this training.

Flight hours per pilot averaged 15.30 in Calendar Year 2003, and 15.83 in Fiscal Year 2003 [See brief in the Appendix on page 135]. This exceeds the 15.25 flight hour requirement contained in the AV–8B Core Competency Resource Model, which establishes a guideline for pilot proficiency and currency. Specific factors, such as individual flight experience, unit operational tempo, and mission type, make the determination of an adequate level pilot training more complex than the simple establishment of a minimum monthly flight hour requirement, but the average 2003 flight hours per pilot met the established basic target.

As described in the brief, the Harrier Review Panel (HaRP) made a number of recommendations that will improve the safety, reliability, and relevance of the AV–8B. The brief outlines a number of ongoing programs to improve the capability of this aircraft.

Mr. MCKEON. What are the required flight hours for an AV–8B pilot? What were the AV–8B pilots' training flight hours per month for each month in calendar year 2003? Is this sufficient for maintaining pilot readiness and expertise on this aircraft?

General HELLAND. Flight hours per pilot averaged 15.30 in Calendar Year 2003, and 15.83 in Fiscal Year 2003 [See brief in the Appendix on page 135]. This exceeds the 15.25 flight hour requirement contained in the AV–8B Core Competency Resource Model, which establishes a guideline for pilot proficiency and currency. Specific factors, such as individual flight experience, unit operational tempo, and mission type, make the determination of an adequate level pilot training more complex than the simple establishment of a minimum monthly flight hour requirement, but the 2003 average flight hours per pilot met the established basic target.

Mr. MCKEON. Please describe the AV–8B tactical value as compared to other Marine Corps, Navy and Air Force tactical aircraft. What specific capabilities does the Harrier have that makes it so valuable?

General HELLAND. The AV–8B Harrier is the only Short Take-Off/Vertical Landing (STOVL) aircraft in the DoD. This STOVL capability enables the Harrier to operate from locations at which all other TACAIR platforms cannot, such as small-deck amphibious ships, austere airfields, and roads. This operational flexibility reduces the burden on aircraft carriers and large fixed air bases, which increases the volume of sorties and ordnance delivery capability available to Joint Force and Combatant commanders while reducing the logistical burden on these heavily-used facilities. The ability to forward deploy AV–8B aircraft reduces response time for providing support to ground forces and engaging time-critical targets, and reduces the demand for aerial refueling.

Mr. MCKEON. Please review for the Committee the capabilities provided by the AV–8B in relation to the Global War on Terrorism and give a brief evaluation of the Harrier's performance in support of Operation Enduring Freedom and Operation Iraqi Freedom.

General HELLAND. The AV–8B performed superbly in both OEF, OIF and continues to in the GWOT. [See brief in the Appendix on page 135].

Mr. MCKEON. Please compare the associated human risks with this aircraft's unique capability with the lives that the successful implementation of the capability will eventually save.

General HELLAND. There is no way to determine how many Marines, Soldiers, Special Operations Forces, Coalition Forces and Civilians who may have been saved by the operations of the AV–8B in the past and present. There are many stories praising what the AV–8B has done from Desert Storm to current operations. With the Harrier's unique capabilities and advanced systems it has undoubtedly saved numerous lives, prevented friendly fire incidents and reduced civilian casualties while providing support to Coalition Forces. The AV–8B is the aircraft of choice requested by the Marine Corps and coalition forces in Iraq and Afghanistan right now, based on the capabilities it brings with it and the support it can provide.

Mr. MCKEON. How much longer will the Marine Corps be flying the AV–8B? How many active-combat ready aircraft does the Marine Corps have? When will the

Corps make the transition to the STOVL JSF? Will the Harrier suffice and provide the needed capability in the interim?

General HELLAND. It depends, but estimation is until at least 2020. There are 7 Active Harrier Squadrons (16 a/c each squadron). Current schedule to begin transition to JSF is FY–12. The AV–8B will have the capability to meet our interim requirements.

Mr. MCKEON. What happened to the Harrier Review Panel (HaRP)? What action was taken on the September 1998 recommendations that the panel made? Additionally, have there been subsequent meetings and findings following AV–8B mishaps occurring after 1998? Does the Harrier's accident rate merit a revisit of the HaRP?

General HELLAND. [See brief in the Appendix on page 135].

Mr. MCKEON. Were any of the five Harriers that crashed this year remans? If so, which ones?

General HELLAND. Yes: 03 Dec 2003 and 08 Dec 2003.

Mr. MCKEON. What is the replacement value in 2003 dollars of each of the fully equipped planes that crashed in 2003 and the total damages for the AV–8B in Bagram?

General HELLAND. FY–04 replacement value of a Radar Harrier is $37.177M dollars. The aircraft damaged in the Bagram mishap will be repaired at an estimated cost of $3.5 Million.

Mr. MCKEON. Was the AV–8B in Bagram on a training or operational mission when it crashed? If it was operational, what was the mission? Please provide a description of this accident and any additional details.

General HELLAND. Operational Mission, Classified. Aircraft departed runway during landing rollout at night. Landing took place at night in a covert, austere environment, located within a combat zone. Landing was performed with lights out during strong crosswinds on a runway only 90 feet wide (typical airfield runway is between 150-300 feet wide).

Mr. MCKEON. I have some specific questions for you. You talked about in our opening statement the mishap rate in Desert Shield-Desert Storm was 8.42 and then in Iraqi Freedom, it is down to 5.96. Do you have that broken out between the different aircraft?

General HELLAND. [See charts below.]

Marine Corps aircraft wartime mishap comparison

	Desert Storm/Desert Shield 8/2/90-3/1/91		
	Class A In Theatre	Class A Not in Theater	Destroyed by Enemy Action
CH–46	1	1	0
CH–53	2	2	0
H–1	1	3	0
AV–8	3	2	5
F/A–18	0	2	0
EA–6	0	0	0
KC–130	0	0	0

Marine Corps aircraft wartime mishap comparison

	Enduring Freedom/Iraqi Freedom (Phase I) 9/12/01-5/1/03		
	Class A In Theatre	Class A Not in Theater	Destroyed by Enemy Action
CH–46	1	1	0
CH–53	1	0	1
H–1	3	4	2
AV–8	1	3	0
F/A–18	0	4	0
EA–6	0	1	0
KC–130	1	1	0

Mr. MCKEON. What percentage of the AV–8B Harrier fleet have we crashed?

General HELLAND. As of March 2004. Marine AV–8B class A mishaps have destroyed 31% of total number of Harriers built for US forces (249 total aircraft, 78 mishaps). Not included in these statistics are (5) AV–8Bs destroyed by Direct Enemy Action (DEA), and (3) aircraft destroyed in mishaps in a Navy squadron (VX–9).

QUESTIONS SUBMITTED BY MR. GIBBONS

Mr. GIBBONS. Do you anticipate extensive grounding of the F–15 as it ages into the future? In other words, as it becomes an older weapon system with more and more expense required to fly per house, with greater and greater maintenance costs, do you see larger numbers of groundings of the F–15, much like what Mr. Taylor asked about the KC–135?

General HESS. The F–15 System Program Office recently completed a nose-to-tail evaluation of the health of the F–15 fleet's structure, avionics, subsystems, engines, and support equipment. They identified critical items for replacement or repair and the Air Force is addressing these through various programming initiatives. The Air Force is also identifying the F–15 fleet's long-term posture so that investments are made smartly based upon expected life of current systems and potential draw down schedules for the oldest aircraft.

Although the F–15 shares many of the issues being experienced across aging Air Force platforms, all potential "grounding issues" are being addressed with current improvement programs or in future budgets. The F–15's aircraft integrity and tracking programs have worked well to keep the Eagle at the forefront of our nation's combat capability. Barring unforeseen technical issues, the F–15 aircraft should remain fully mission viable through its assigned life.

QUESTIONS SUBMITTED BY MR. MILLER

Mr. MILLER. I was under the impression that the CV–22 that is coming in to replace the Pueblos was going to be coming online sometime in the 2008 time frame. Is that still correct?

General HESS. All references to "Pueblos" should be changed to reflect "Pave Lows" for accuracy. The CV–22 will begin arriving at Hurlburt Field, FL,=in FY07, will achieve Initial Operational Capability (IOC) in FY09, and Full Operational Capability (FOC) in FY17. In the end, there will be a total of 26 CV–22s at Hurlburt Field. The MH–53 Pave Lows will be completely drawn down by FY12.

	FY07			FY08			FY09*			FY10			FY11			FY12		
	M	T	B	M	T	B	M	T	B	M	T	B	M	T	B	M	T	B
CV–22	2	1		4	1		6	1		6	1	1	12	1	1	12	1	1
MH–53	16			16			13		3	10		3	5		2	CLOSE		
M-Mission Aircraft Inventory; T-Training Aircraft Inventory; B-Back-up Aircraft Inventory																		

Mr. MILLER. Has the Navy conducted an in-depth ORM review of the use of the T-34 to determine if the cost of maintaining it in an airworthy status is still cost effective?

Admiral BROOKS. The Navy has not done a one-time formal ORM review of the use of the T–34. ORM however, is not a one-time process and the engineers and professionals at NAVAIRSYSCOM are in a constant process of evaluating all type/model/series of all aircraft in the inventory. In the course of evaluating the T–34 in the past few months, some issues were brought to light:

1) The T–34C is the most flown and least expensive aircraft operating in the U.S. Navy inventory.

2) A fleet of 309 aircraft fly 170,000 flight hours a year at $347 per flight hour.

3) The T–34C has not in its history experienced a single class Alpha mishap due to a material failure.

4) The T–34C mishap rate is .63, one of the lowest in the DOD.

While an evaluation of this program can be accomplished at any time, the above facts indicate that this airframe is one of the safest and most inexpensive to operate in the fleet.

QUESTIONS SUBMITTED BY MR. KLINE

Mr. KLINE. I applaud the efforts the military aviation community has made in reducing mishap rates since my flying days. I apreciate the strong efforts made by each organization to take care of our sons and daughters engaged in military service today. I find it disheartening, though, to learn that it is only recently that the Army has begun an aviation safety curriculum for officers charged with command when the other services have incorporated such a program for many years. How do you explain an 11.42 T–34 mishap rate in the marine Corps and yet a substantially lesser rate in the Navy?

Admiral BROOKS. The mishap rate for the Navy for the T–34 is .63 and for the Marine Corps is 11.42. The bulk of the Navy's flight hours (1,588,019) for the last 10 years were in the very controlled and regimented training command environment. The Marine Corps generated fewer flight hours (39,995) resulting in high mishap rates with 2 Class A mishaps Currently the only USMC squadron that owns and operates T–34's is VMFAT-101 at MCAS Miramar. They are used for target spotting, FAC–A, and local training sorties. The squadron has two aircraft assigned.

QUESTIONS SUBMITTED BY MR. ORTIZ

Mr. ORTIZ. How long has the current model T–34 been in service?

Admiral BROOKS. The T–34 has been in service since Dec 76. The fleet age of the aircraft runs from 14 to 28 years. T–34C Aircraft were procured in lots as follows:

QTY	Delivery Dates
116	DEC76-MAR78
67	APR78-APR83
150	APR83-FEB84
19	AUG89-JUN90

Mr. ORTIZ. In your opinion, is the T–34 too old an aircraft to be safely used as a pilot trainer?

Admiral BROOKS. No, the T–34 is not too old of an aircraft. There hasn't been a single Class A, B or C mishap relating to structural fatigue/failure in the T–34 in the past 5 years, and it has never experienced a Class A fatigue/failure mishap.

Mr. ORTIZ. Are there any systems that are currently incorporated into the T–34 that are designed to measure stresses placed throughout the aircraft and warn of impending failure? Are there any technology systems not being used that could be?

Admiral BROOKS. In addition to an extensive inspection process, the T–34C is equipped with a Counting Accelerometer Group (CAG), which measures, and records loads applied to the airframe. These loads are measured in terms of "G's". The CAG measures and counts loads at four different levels: ≥3G, ≥4G, ≥5G, ≥6G. The data from the CAG is recorded by maintenance personnel every 100 Flight Hours. This data is then submitted to the Aircraft Manufacturer, Raytheon aircraft (RAC). RAC has been tasked by the Navy via an Engineering Support Contract to evaluate this data for each T–34C aircraft. Using proprietary structural data and Navy supplied CAG data, RAC evaluates critical points on each airframe in terms of percentage Fatigue Life Expended (FLE). By this measure, an aircraft (or critical component) is Fatigue Life "expended" at 100% FLE. Currently, the average FLE for the 309 U.S. Navy T–34C Aircraft is approximately 70% with an average expenditure rate of 3.5% per Year.

While a number of new technology systems (exceeding the capability of the CAG) are currently in development, none are approved or applicable for use in the T–34C.

When Naval aircraft reach 100% FLE they are retired, remanufactured or have major components such as wings replaced to extend the FLE.

QUESTIONS SUBMITTED BY MR. ABERCROMBIE

Mr. ABERCROMBIE. Please comment on each of your services' requirements and plans to assure safety of flight with continuous smoke in the cockpit.

General SMITH. Army turbo prop aircraft that are pressurized have emergency procedures outlined in the operators' manual. First and foremost is the donning of oxygen mask and smoke goggles by the crew and providing oxygen for passengers. Other steps are to isolate the source of the smoke or fumes, i.e. turning off electrical equipment, turning off fan blowers or closing down bleed air systems. After progressing through these steps without success, the remaining steps in the procedure call for rapid cabin depressurization by positioning pressurization controls to the Descend or Dump positions and opening vent windows or ram air vents.

Army jet aircraft (US–35 Citation) procedures for smoke and fume elimination are similar to turbo prop aircraft as far as crew actions for donning oxygen masks and providing passenger oxygen. The procedure for isolating the source requires the selection of different pressure sources, isolating which system is providing the smoke and allowing the air cycle machine to clear the smoke and fumes with each pressure source selected. If unable to isolate the source, the aircraft will be pressurized by the Left Hand pressurization system only, controlling temperature and pressure inside the aircraft while descending to an altitude less than 14,000 feet, at which time an emergency dump switch can be activated causing depressurization. The final step would be land as soon as possible (land at the nearest suitable landing area without delay). Due to emergency pressurization systems, these aircraft cannot dump cabin pressure until the aircraft has descended to 14,000 feet or below.

Army rotary wing aircraft procedures for smoke and fume elimination are to put the aircraft in an out of trim configuration and lower the windows. If the windows cannot be lowered, jettison both cockpit doors. Other steps are to isolate the source of the smoke or fumes, i.e. turning off electrical equipment, turning off fan blowers or closing down bleed air systems. After progressing through these steps without success, land as soon as practicable (land at a suitable landing area).

General HELLAND. 1. Continuous smoke in the cockpit (often referred to as, 'smoke and fumes in the cockpit') is a critical issue for commercial and military aviation. However, due to multiple differences between tactical and commercial aircraft, the incidents, severity, and consequences of 'smoke and fumes in the cockpit' are much greater in the civilian commercial airline industry than in Marine Corps aviation. Marine Corps aviation has established aircraft specific emergency procedures to displace smoke from aircraft cockpits when these rare incidents occur. The procedures differ for each aircraft type but in general provide proven methods for expeditiously dissipating smoke.

2. When an incident of smoke and fumes in the cockpit occurs, it is reported via the Marine Corps hazard reporting system. This system allows commands to identify safety of flight incidents to the appropriate service organization for resolution of the problem. Over the past ten years there have been only nine incidents of smoke and fumes in the cockpit in nearly 4,000,000 flight hours within Marine Aviation. This works out to an incident rate of 0.23 (# of incidents per 100,000 flight hours.) None of these incidents resulted in a Class A Flight Mishap and no incidents

have occurred in the last four years. Current and routine trend analysis shows no incidents have occurred in the last four years. Current and routine trend analysis shows no change in the number of smoke and fumes incidents within Marine Aviation. Additionally, each 'type aircraft' program office holds recurrent System Safety Working Groups, providing yet another mechanism of feeding safety issues into the acquisition realm of Naval aviation (NAVAIRSYSCOM). The Marine Corps is confident that adequate plans, policies, and procedures are established to ensure the safety of Marine Corps aviators in regards to this matter.

QUESTIONS SUBMITTED BY MR. REYES

Mr. REYES. What role has stress fatigue in aging aircraft had in mishap rates over the past ten years? Is it the consensus of the panel that structural failures in aircraft do not contribute to mishap rates?

Admiral BROOKS. Stress fatigue in aging aircraft has very little role in mishaps. Over the past 10 years, there have been 45 HAZREPS dealing with structural fatigue/cracks/failures in Naval Aviation. Over 90% of those incidents were discovered on post flight or turnaround inspections. Additionally, there were 9 Class C flight mishaps, 6 Class B flight mishaps, and 2 Class A flight mishaps in that same period. The Class A flight mishaps account for 2 out of 312 total flight mishaps, or less than 1%.

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